

AVIATION WEEK

OCT. 20, 1947

INCORPORATING AVIATION AND AVIATION NEWS A MCGRAW-HILL PUBLICATION



It's *Airfoam*

for comfort on the newest ships

Seats for both pilot and passengers in the new Grumman 10-passenger Mallard pictured here, like those in many new super-airliners, are cushioned with Goodyear's AIRFOAM for three very important reasons. First, this wonder-soft latex cushioning is so superbly comfortable it lessens flying fatigue, easing strain on pilots and assuring passengers a more restful ride.

Second, its amazing durability eliminates

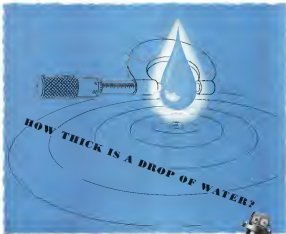
seat maintenance and repair—seats keep their trim look and luxurious comfort for the life of the ship. Third, an important weight saving can be effected by designing seats to take full advantage of AIRFOAM. For full information concerning this modern, lightweight, luxury cushioning, write: Goodyear, Aviation Products Division, Akron 16, Ohio or Los Angeles 54, California.

Airfoam—T.M. The Goodyear Tire & Rubber Company



MORE AIRCRAFT LAND ON GOODYEAR

TIRES TI



HONEYWELL gasket is the result of close attention to every engineering detail. The spacing of electrodes on each side of the electronic fast gage is an example of such careful engineering. Very narrow spacing would have complicated the design job but false readings might result from random moisture bridging the gap between narrowly spaced electrodes.

To guarantee the accuracy of Honeywell's responsive type gage, Honeywell engineers carefully measured the largest droplets of water that could be made to cling to the

electrode surfaces, then spaced the tubular electrodes .158 inches apart to insure that no false readings would be caused by droplets bridging the gap.

This example of Creative Engineering is spread of Honeywell's refusal to accept anything less than the utmost in the quality of Honeywell products. A policy that ensures peak performance, long life, and maximum maintenance cost for the aviation industry. Minneapolis Honeywell Regulator Co., Minneapolis 8, Minnesota. In Canada: Toronto 14, Ontario.



MINNEAPOLIS
Honeywell
AERONAUTICAL CONTROLS



Member of the Division of R. C. Thompson
Honeywell Company
400 West 12th Street, Minneapolis, Minn.

Smart Guy!

SMART? . . . Sure he's smart. He knows there's a lot of difference between the three FORM-A-GASKETS!

FORM-A-GASKET No. 1 (a paste) sets fast but not too fast. It dries hard but not brittle. It's a swell product for making pressure-tight, leak-proof unions even when surfaces are warped.

FORM-A-GASKET No. 2 (a paste) sets a little slower than No. 1. It dries to a tough, pliable layer into which you can push your finger nail. It resists plenty of pressure—yet disassembles easily.

AVIATION FORM-A-GASKET No. 3 (a liquid) does not dry but it sets itself into position in a short time. It will not run when heated even to 400° F. Nor will it become hard and brittle at temperatures down to 70° below zero. It's a great, all-around product!

PERMATEX COMPANY, INC.
BROOKLYN 29, N. Y., U. S. A.

"FLUOROSCOPE" OF YOUR AIRCRAFT'S HEART...



PROVIDED BY NEW SPERRY ENGINE ANALYZER

■ The new Sperry Engine Analyzer will enable your flight engineer to keep his eye on the pulse of his engines—primarily visualize the slightest irregularity in engine function. In the analyzer window the flight engineer can examine at any time during flight, patterns that show the characteristics of engine vibration, engine system performance, and synchronization between engine magneto and between engines. These characteristic patterns detect, locate and identify the malfunctions and impending failures that may occur during flight operations.

■ When the airplane comes into an

airport, specific engine maintenance needs are already known. Small mechanical corrections can then be made in minutes instead of the hours formerly required to locate the cause of malfunctions. This results in an increased number of possible flying hours per day and greater reliability in meeting schedules.



Sperry Gyroscope Company, Inc.

EXECUTIVE OFFICES: GRAFTON, MASS. NEW YORK • DIVISION OF THE SPERRY CORPORATION
NEW YORK • LOS ANGELES • SAN FRANCISCO • NEW ORLEANS • CLEVELAND • SEATTLE



■ Our Airframe Department will be glad to supply complete details.

BUSINESS IN THE USAF—While public attention to the new United States Air Force has been centered on the twinkling of the stars in the reshuffle of the high command, more significant changes have not been as well-delineated.

Actually, USAF is now not just by statute, but in the concept of its administration. This has deep import for industry. The military will run USAF operationally. But the business end of the Department of the Air Force will be handled by business men. Although an obvious dream of responsibility, this is a departure in Air Force history.

The change will be manifested principally in procurement. When the AAF was part of the War Department, AAF procurement was under the administrative supervision of the Undersecretary of War. The assistant Secretary of War for Air had no responsibility in budgeting or procurement matters. The Undersecretary of the Air Force department now assumes this function.

SYNINGTON IN SAIDLE—The change was dictated of course by the statute establishing the Air Force as a separate department. But it is dictated also by the character of Air Force secretary Synington.

A product of business, he is convinced of the efficacy of business methods in any situation and has little patience with, or desire to conform to, usual Governmental protocol. A thinker, always striving to improve procedure, he is expected to take an active interest in all facets of the Department's administration.

On the administrative side, procurement and the budget are the two main problems of Synington's new Department. The procurement problems largely are concerned with legislation, and most Congressmen shun.

Procurement of non-purchase items for USAF, such as clothing, food and other supplies, will continue through the Army's Quartermaster Corps, and does not involve any particular difficulty. Revision of existing procurement laws to give USAF more discretion and make possible expeditious procurement of aircraft, and long-range planning are the main items of the bill of particulars Synington likely will present to Congress.

BUDGET WRANGLE—AAF under the War Department was always bothered by budget problems, the attempt to reconcile its views of what was necessary with War Department plans, largely framed by general officers. The situation now is different only in degree.

Defense Secretary Foranah, through whose office budgets for all three of the services—Army, Navy and USAF—must pass, is understood to take the attitude that as the services are prepared under the law, there must be parity in appropriations.

Airpower proponents quickly point out that there can never be parity, operationally (how many air drops equal one fleet, or vice versa?) and see little validity in basing appropriations used for operational purposes on a legislative basis of equality.

So far, all seems well. Synington, a polished negotiator, apparently is on excellent terms with his two colleagues the Army and Navy secretaries. Preliminary agreements on budgets has been reached, although it is always the specifics, in terms of dollars, that produce conflicts.

As of now, although this may change, there is no plan to ask Congress for a supplemental USAF or Army appropriation.

MANPOWER SHORTAGE—While procurement and budget policy constitute the two greatest headaches of the administrative side of USAF, the operational side has its own worries. Main one is manpower. The force has an authorized strength of 55 groups. Its actual size is 35 peacetime groups.

USAF hopes to reach authorized strength by the first of January.

There is no worry expressed openly by USAF officers as to the disaster, in contrast to the size, of its operational force. To do so, in the view of critics, would be to condemn the USAF's own planning.

There is opinion that USAF is repeating the mistake made in previous days when the cry was that the Air Corps, while small in numbers, was superior in quality. Any USAF superiority today is on drawing boards and in word trends and test models.

THE LINE-UP—Our present Strategic Air Force is based on the war process B-29. There are several hundred of these operational and more in reserve. The B-29 successors—apparently of superior performance—the B-50, B-36 and B-57 and being tested. Orders for all three aggregate less than 300.

USAF's fighter force is built around the P-80 of which more than 1,000 have been delivered or orders for about 3,000. The only other known production order for jet fighters is for the P-84, involving about 500 planes. There are on order 250 P-82 twin Mustangs, only receiving fighter licensing in USAF plans.

The World War II medium bombers will all be replaced by jet bombers.

PICTURE OVERDRAWN—That is perhaps a superficial and unduly harsh assessment of U. S. airpower as embodied in the United States Air Force. The true nucleus of the Air Force to meet its immediate emergency can only be measured in terms of its likely opposition. On that test, qualified observers rate it high.



**INCREASE
AIRPLANE REVENUE**

**INCREASE
STUDENT TRAINING**

**INCREASE
AIRPLANE RENTALS**

**INCREASE
FLYING SAFETY**

with
FEDERAL
ALL-METAL
Skis

Don't let snow close the airport
you operate on. Equip your
planes with skis and keep them
flying. Make every winter flying
hour count in a profit.

Schedule flying without snow
and ice. Encourage
more charter trips. When heavy
snow falls stop all other forms of
transportation, you can get
there with Federal All Metal Skis.



Every Field
A Landing Field

FEDERAL
AIRCRAFT WORKS
MINNEAPOLIS 13, MINN. U. S. A.

For FIVE CATALOGS, ask for BROCHURE or write
Mr. Fred Johnson, 1000 Federal Avenue, St. Paul,
East A., Minneapolis, Minn.

NEWS DIGEST

DOMESTIC

Civil Aeronautics Administration will announce direct agreements of the Landing Aids Experiment Station at Anacostia, Calif. next Jan. 1. The station will continue to be operated by Transcon Air Lines under post Army-Navy CAA funds. Present equipment includes radio, several types of high intensity lights, instrument landing system and ground control approach system.

Eugene W. Pritchard has relinquished his resignation as head of the aviation section, division of insurance and development, state of Missouri effective Dec. 1. He is leaving to accept a new post as director, Detroit metropolitan aviation authority.

Lowell H. Swenson, executive vice president, National Aeronautic Association, will resign that office next Feb. 1 to return to private industry. Arthur I. Rosenberg, NAA president, is expected to resign on that same date, although he now as office continues to Jan. 1948.

Pacific Airmotive Corp. has signed a contract with Santa Fe Skyway, Inc. for the service and maintenance of all Skyway equipment, including overhaul of P&W R-1830 and R-2000 engines, accessories, propellers and instruments.

U. S. Airlines, St. Petersburg, Fla., is accepting for the purchase of outstanding stock in Wilbur Air Service, Teterboro, N. J. Both are members of the Independent Airflight Association.

FINANCIAL

National Airlines Corp. reports a net loss of \$474,996 from sale of securities for the most recent period ended with September, against a net profit of \$421,163 for similar period a year ago. Ordinary income for current period was \$19,976, compared with \$109,305 last year.

Booster Aeronautical Corp., in process of voluntary liquidation, reports loss of \$113,033 for period July 1 Sept. 15, 1947. Application of net collection of reserves of \$132,037 produced a net credit to surplus of \$128,379.

FOREIGN

United States and Austria have signed an interim air transport agreement, based on the ICAO standard form, to facilitate and promote the mutual economic development of air transportation between the two countries. It is the first air transport agreement concluded by Austria since the war.

Yugoslavia, the post-Soviet Yugoslav airline, opened four new domestic routes within Yugoslavia, including a daily round trip between Belgrade, Zagreb and Sarajevo.

**DEPENDABILITY
ACCURACY
ECONOMY**



Since 1923, Whitehead has supplied American industry with stampings known for their quality. Write for Catalog.



**WHITEHEAD
STAMPING CO.**

1475 W. Lafayette Blvd.
Beverly Hills, California



This type of machine, combining high efficiency and low scrap, is ideal for stamping out large quantities of parts. It is the only machine that can stamp out of other types of metal.

WHITEHEAD STAMPING CO.,
Beverly Hills, California



Everybody agrees
COSTS MUST COME DOWN

One important place to seek reducing costs is with the machines where goods are made.

Speedier production is very definitely a function of New Departure ball bearings.

Operating with less friction, less wear, two other types, the ball bearing is a "mustard" for the higher speeds, greater rigidity and improved quality of product demanded by today's exacting production methods.

Thus, an investment in machines of perfect ball bearing design is an investment in faster production—lower cost.

New Departure's technical Bureau is helpful. Tell us your needs.



nothing rolls like a ball

NEW DEPARTURE
BALL BEARINGS

177 of machines
used in industry
and commerce
use New Departure
ball bearings.

NEW DEPARTURE • Division of GENERAL MOTORS • DETROIT, CHRYSLER • Branches in DETROIT, CHICAGO, LOS ANGELES and Other Principal Cities

AVIATION WEEK, October 20, 1947

**"If it isn't Wide Enough
It isn't Good Enough"**

**...TO MEET
TODAY'S PROBLEMS**

**GET 3 DESIGN BENEFITS WITH
NORMA-HOFFMANN
"CARTRIDGE" BEARING**



CONVENTIONAL Single Row Ball bearing has small contact capacity

NORMA-HOFFMANN cartridge bearing has lock washer gives rigidity

**Here's What
You Get**

- 1. Longer Life** A 100% greater grease capacity than conventional width sealed bearings. This means longer grease life... longer periods between relubrication—because a large volume of grease does not oxidize or dry out as readily as a thin film of grease.
- 2. Greater Contact Area** 43% to 85% greater contact area between shaft and bearing bore and between housing and bearing O.D., as compared to conventional width bearing. This eliminates need for locknuts and results in greater shaft strength as it is unnecessary to cut locknut threads. Slippage and peening are also prevented.
- 3. Full Load Carrying Capacity** Utilizes many other sealed bearings, full after halls are used; hence, there is no reduction in load carrying capacity.



**America's
No. 1 SEALED BEARING
by
NORMA-HOFFMANN**

**NORMA-HOFFMANN BEARING CORPORATION,
STAMFORD, CONNECTICUT**
SOLE OFFICE: New York, Chicago, Cleveland, Denver,
St. Louis, Cincinnati, Los Angeles, San Francisco, Seattle,
Portland.

Vol. 47 No. 16

**AVIATION
WEEK**

Oct. 20, 1947

INCORPORATING AVIATION AND AVIATION NEWS



JET ENGINE TEST CENTER: Aerial view of the National Advisory Committee for Aeronautics Flight Propulsion Laboratory located on the edge of Cleveland Municipal Airport. Largest wind tunnel visible is the aircraft tunnel. Largest building in the foreground is the engine research center where new materials, tests and instruments for jet engines are under development. (NACA Photo)

Supersonic Compressor, New Ramjets Revealed at NACA Show

First inspection of Cleveland Flight Propulsion Research Laboratory unveils jet engine progress to 1,000 engines and executives.

By ROBERT HOTZ

Results of the first solid year of intensive research in turbojets, ramjets and rocket engines by the Flight Propulsion Research Laboratory of the National Advisory Committee for Aeronautics were unveiled last week in the first annual inspection of NACA's Cleveland, Ohio facilities.

Presenting in the inspection were 1,000 aviation executives, engineers and military representatives who saw the first flight of a new NACA jet engine director involving in his new role for the first time.

Improvements—Lessons—The NACA then indicated that while jet and rocket engines are still in a relatively crude state, basic research has progressed considerably further than is generally realized. As a result substantial gains in the power, durability, and producibility of turbojets, turbojets, ramjet and rocket

engines have in the immediate future. Practically no work is being done on supercritical engines in the vast research laboratories on the edge of Cleveland Municipal Airport that were originally built to make possible a 4,000 hp supercritical engine.

The 4,000 hp engine required testing facilities to produce 20 lb. of air per second. Jet engines now under test at Cleveland already equal 50 lb. of air per second and jets now on the drawing board will require up to 400 lb. per second. As a result an extensive construction program is underway to provide new tools for the high altitude and supersonic testing required by the new well-defined trend in jet and rocket progress.

In addition to two supersonic tunnels already operating, two new ones are under construction, one of which will

reach much higher than 5. The other will be many times larger than any supersonic tunnel now undergoing construction.

Supersonic Compressor—Probably the outstanding development exhibited at Cleveland was the NACA developed supersonic axial flow compressor that has been successfully operated on hydrogen gas and has run at supersonic speeds. This development permits a single stage compressor to do the work that formerly required multi-stage compressors. According to Dr. Dryden the supersonic compressor permits drastic reductions in size, weight and complexity of construction at a cost, at least initially, of some loss in efficiency. The laboratory is also working on novel flow type compressors.

Among the other fields in which aviation research is under way are:

Ramjet-Spacer—Up to 1,500 mph have been attained by 16 inch test model ramjets in deep trails off the Virginian Capes. Free different designs are now under test. Basic research completed to date indicates that ramjet powered, long-range aircraft with ranges of from 2,000 to 4,000 miles at speeds of about 1,400 mph are now possible. Main lines of current research include evaluation of basic aircraft at supersonic speeds; improvement of combustion efficiency; better pressure recovery methods and the search for the most efficient means of bringing air in from up to the high speed (about 600 mph) required for initial compression in ramjet.

Pushing—Strong indications are that jet turbo compressors will replace current types at full jet and rocket engines offering an increase of combustion efficiency per unit up to 30 times that of current turbo compressors. Only the potential use of nuclear energy appears to offer more promise than the metallic compressors based on boron and aluminum.

Materials—Development of a new type of material called General—A family of composites and alloys—Alloy—shows promise for turbine blades. Other developments include coating of turbine alloys with ceramic and combustible progress in working ceramic materials into the intricate shapes required in jet engines.

Thrust Augmentation—Three methods of thrust augmentation have reached an advanced state of development—after-

burning in the tail pipe, water-alcohol injection and air bleed-off with secondary combustion and jet. Afterburning is to be the most consistent at achieving a 15 percent increase in thrust with a fuel flow of 90 gal. an hour. Water-alcohol injection offers a 25 percent increase with 60 gal. per hour added bleed air. Air bleed-off has given the best results—87 percent increase in efficiency requiring 190 gal. more fuel per hour. Using an bleed-off it is possible to get 7,000 lb. static thrust for short periods from a normally rated 4,000 lb. jet engine.

► **Using two methods** of consulting the critical intake using problems in jet engines are being studied as intake apertures that keep the heavier apertures and intake ducts and the flow to the compressor and bleed-off of hot exhaust gas to heat the air intake.

► **Ducts—Apertures** are under way with three types of diffusers for turbojet and turbofan engines to maintain shock wave effects on the air flow. Spike diffusers aim to keep the shock waves well in advance of the air intake face while perforated and convergent-divergent diffusers are designed to keep the shock in the corner of the engine inlet. The compressor in turbojets and turbofans is unique.

Awaiting other problems under investigation are high altitude lift-off, intake, fuel distribution, engine inlet and event cooling for rocket engines.

Congressional Group Splits for Studies

The Congressional Air Policy Committee and its 15-member Industry Advisory Council, now dependent on the U. S. and European air week editorial, little likelihood of action before the re-opening of Congress in January, although the group's chairman, Sen. Owen Brewster (R., Me.), has announced the continuing membership in Washington Oct. 26.

After inspection tours of the newer Mach 2 at Norfolk, Missouri Field at Montgomery, Ala., and Eglin Field, Fla., under Brewster's plans, the first subcommittee that were been appointed would immediately set to work in their specialized fields. It appears unlikely, however, that a sufficient number of committee members and advisors will return to Washington for group action.

Key subcommittee on conduct aircraft, designated to draw up the national defense aviation program which may include defense, the Senate of course as well as military aviation, is headed by Rep. Carl H. Busch (R., Calif.). In addition to its primary objective of strengthening combat plane requirements, the subcommittee will



EXPERIMENTAL RAMJET: Flight testing of an experimental ramjet aircraft is shown at the National Advisory Committee for Aeronautics Cleveland flight propulsion laboratory. Other NACA aircraft have attained a speed of 1,500 mph. in two flights.

delve into military policies on research, airports, safety regulations, and training.

Other members are Sen. Homer Capehart (R., Ind.), Sen. Ernest McFarland (D., Ark.), and Rep. Paul Kilgus (D., Tex.). Advisory members are Maj. Gen. Hugh J. Kester, Adm. John Towney, J. H. Kneidelberger, and Carlton Ward.

Other subcommittees

► **Manufacturing—Headed** by Sen. Albert Hayden (R., N. J.), a former U. S. Chamber of Commerce president, this subcommittee will deal with industrial mobilization, procurement policies, research and development, finance, and aspects to frame comprehensive legislation in these fields. Members, Sen. Charles Wherry (R., N. J.), Sen. Ed Johnson (D., Colo.), and Rep. Alfred Balch (D., N. C.) are members, and advisors are Richard Dwyer, Robert Grinn, J. M. Kneidelberger, J. M. Hurren, Carlton Ward, Joseph Kenna (AFLA), Victor Emmanuel, Charles Sommers, Ken Knott, Adam Towney, and Gail Robb Wilson.

► **Transportation—**This subcommittee, with a goal of comprehensive legislation reviving the 1916 CAA act, is headed by Sen. Owen Brewster

(R., Me.). Although the controversial chosen transportation issue will be avoided, the subcommittee plans to investigate all other problems of military as well as civilian transport. Members are Hurdson, Capehart, Rep. Karl Stefan (R., Neb.), Johnson, and Kilgus. Ralph Dawson, Earl Slick, Carl Roscoe Turner, P. M. Litchfield (representing Litchfield-Turner), Joseph Kenna, and Gail Robb Wilson serve as advisors.

► **Governmental Organization—**In addition to the physical organization of government agencies on aviation, this subcommittee, headed by Sen. Capehart, plans to review functioning, with particular emphasis on the division of regulatory procedures. Members, Walter, Stefan and Balch are members, and Gail Robb Wilson, Earl Slick, and Ralph Dawson, advisors.

Langley Myers, committee executive secretary, expects to organize a staff of eight administrative assistants, plus liaison assistants in the Air Force, Naval Aviation, CAA, GAI, and Commerce Department, and Air Policy Commission.

NAA Awards

Eight life memberships in the National Aeronautic Association will be presented at a dinner meeting celebrating the Association's 75th anniversary, Oct. 22 at the Washington, D. C. Statler Hotel. Life certificate recipients are Glenn L. Martin, pioneer flyer and manufacturer; Jacqueline Cochran, woman speed record holder and the first woman to fly across the Atlantic; Dr. George W. Lewis, scientist, former research director of NACA, Roger Wolfe Kahn, of Convair Aircraft Engineering Corp., NAA judge and timer at many air shows and meet; Francis Twiss, Milwaukee businessman; Alvin Adams, Cleveland, woman flyer and chairman of the Wing Section National Advisory Committee; John D. Adams, Des Moines Chamber of Commerce secretary; Ames Carter, Pil. Wash. publisher.



Members of the President's Air Policy Commission, testing the nation's aircraft manufacturing plans, are shown as they watched a shop hummer model. Business jets being built by Boeing Aircraft Corp. at Wichita. Left to right: John P. Galt, vice president and general manager at Boeing; James Ireland Galt and Charles, Joseph Galt, President Aircraft Commission; J. A. Thomas R. Feltner, Commission chairman; Commissioner John McCord; Vice Chairman George Baker, and Commissioner Robert Hoyt, who joined the party at Wichita.

Two Air Policy Groups Planning New Legislative Programs

Similar findings by President's and Congressional committees may result from uniform testimony.

Prediction that the two fact-finding bodies now examining the aviation picture are likely to arrive at nearly the same conclusions so to remedial efforts necessary is being made by Washington observers, despite the fact that two separate political groups control the fact-finding.

The forecast is based partly on the fact that many of the witnesses before President Truman's Air Policy Commission are also doubling as consultants to the joint Congressional Air Policy Committee. The Congressional group has available the transcript of testimony and the briefs filed before the President's Commission and eventually will have its recommendations as a further guide. It is difficult to conceive of the Congressional committee finding even if it looks for responsible evidence contradicting the formidable mass of industry testimony which has been relied on in recent weeks before the Commission, supplemented by secret sessions with top military leaders.

Basic industry recommendations summarized last week by Maj. Gen. Oliver P. Echols, president of Aircraft Industry Association, are:

- **Accelerate aviation research and development** as vigorously as is required to obtain and preserve air leadership.
- **Maximize utilization volume of procurement** to supply necessary replacement airplanes so that Air Force will be an effective combat force in emergency with maximum advance warning.
- **Long-term aircraft procurement** at least five years duration, with mandatory replacement rate of 25 percent a year.
- **An adequate industrial mobilization plan**, to ensure adequate supplies in emergency.
- **Foster uncoordinated aviation development**, so that in transportation, air cargo and passenger flying can make maximum contribution to maintaining necessary aircraft industry aircraft necessary for national security.

Reports that the President's Air Policy Commission had asked for a

digest of all recent and pending aviation legislation was interpreted in some quarters as indication that the Commission might propose some definite aviation legislation in its recommendations to President Truman, perhaps for him to forward in a message to Congress.

Aviation legislation growing out of the two fact-finding bodies should not be expected to start its way through the legislative process until the Congressional committee submit its report in March. Presumably any aviation legislation introduced before that time will be held inactive until the Committee report. Since the joint Committee is still composed of the House and Senate members which take consecutive action on aviation legislation, it is likely that any legislation which the joint committee agrees to recommend will then have virtually swift sailing.

There is speculation that the joint committee may report out of committee several bills embodying the changes it wishes to recommend simultaneously with its report, which would step up the whole legislative timetable entirely.

► **Witnesses listed**—In addition to Gen. Echols' testimony last week, the President's Air Policy Commission heard Robert Giam, Lockheed Aircraft Corp., president; J. Carlisle Ward, R. Field (AFLA) Engine & Airplane Corp., president; Capt. C. H. Schellhaas, president, U. S. Flying Ship, Inc.; J. R. Bennett, president, Sperry Corporation; C. Lee, Rayson C. Sharkey, president, Aerospace Maintenance Corp.; J. N. Paschke, president, Paschke Helicopters Corp.; and Richard B. Gossage, Allison division, General Motors Corp.

Mid-Atlantic Ditching

Starts CAA Investigation

CAA started an investigation last week into the emergency landing Oct. 21 of an American Lockheed L-1049 Super Constellation 314-A flying out of the Atlantic Ocean 640 miles southeast of Newfoundland on a Shannon-Newfoundland flight.

The plane carried 62 passengers and several crew members, according to first reports. Charles Martin, the pilot, claimed he had not it down without injury or damage near a Coast Guard search ship after strong headwinds depleted his fuel supply.

The New York company has been spending under a letter of instruction from CAA, but had no CAA certificate for common carrier operation under sec. 42 of the Civil Air Regulations. CAA says it was when the flight was down on a strictly contract basis or seats were sold through a public ticket agency, as well as the exact circumstances of the forced landing.

IATA To Standardize Traffic Practices

Action possible as result of traffic conferences in Brazil.

PETROPOLIS, Brazil—Standardization of traffic practices on the world's airlines probably will result from the meetings of the International Air Transport Association's traffic conferences being held here.

G. R. McGee, general traffic manager at Trans-Canada Corp. and chairman of the past meeting of the traffic conference, announcing the decision of the first of the two weeks of sessions, said:

"The resolutions establish a single body of language and practice in international airline traffic matters throughout the world. It is the first time this has ever been done for any form of transport, and its importance cannot be overestimated."

Among the measures on which the traffic representatives of IATA's 65 members agreed:

- Standard rights for passengers and co-termini baggage, and standard baggage checks, replacing existing forms.
- A universal air waybill and assignment note to succeed a variety of forms, the complexities of which, according to McGee, have caused much loss of time and cargo.
- Standardization of "manifests of earnings" (tickets, baggage allowances, movement procedures, etc.).
- Standardization of international air routes, with flight between the north and west being added to those toward the south and east over the ocean.
- Agreement on the principles of airline dealings with agents and scheduled hours of operations.

Executive director for ratification of the new practice was set at July 1, 1948, but some time, McGee said, probably would make these effective earlier. Some discussion, applying to service between two or more continents, must first appear by governments.

In adopting their resolutions on standardization, the traffic officials followed the lead of IATA's director general, Sir William F. Hildred, who told them at their opening meeting Sept. 30 that "millions of dollars' worth of cargo are waiting to move over the airways as soon as an internationally accepted cargo document alone has been developed."

Paris Letter:

French Private Flying Clubs

You can almost see these sportsmen who French private flyers talk about the Piper Cub and other single-seater American mail planes. Yet they have bought only a few of them, and altogether there are only 100 or 200 privately-owned mail clubs in France.

Considerably more Frenchmen and North Africans could afford to own a plane, and could even manage to acquire a pilot to buy an American one. But they hesitate—because of taxes. The average mail-to-day Frenchman maintains his interest and property in the air collector as much as possible. The government consequently sets a minimum age of 18 in acquiring the aircraft of 18 or more in an individual mail plane. And a personal plane in France is a flying pig of high expense. It is much easier to fly a two-seater plane used as a commuter with friends in an area.

Actually most private flying is organized into these clubs, of which about 400 exist in France and French North Africa.

The clubs themselves have tried to get American capital. For months Abel Legrand, Secretary-General of the Fédération Nationale Aéronautique, which groups all the clubs, fought with the French government to buy 450 Piper Cubs as U. S. Army surplus in Germany. The lot could have been had for about \$200 apiece, but the government wasn't willing to make available the foreign exchange and the Cub was instead to Sweden, Canada and Spain. Similarly, the North African air-club is bargaining for dollar exchange needed to buy 50 surplus Panchard Packets from the Alps. But with France's current dollar crisis, they have little chance of success.

In contrast to the advanced growth of private flying in the U. S., air-club life has a long history in France, where personal flying has been primarily regarded as a sport. In 1939 there was about the same number of clubs as at present (1950), though the present ones have had largely to be reconstituted after the Liberation.

One of the clubs' most important functions has been to assist French youth in aviation and train young Frenchmen as pilots and, to a lesser extent, as mechanics. The clubs' programs include construction of models and flying in gliders, as well as flying and parachuting planes.

Englishmen's youth is interested by the membership figures for the air-club. Of a total of 150,000 members, 30-40,000 are under 17 years old, 50-60,000 are between 17 and 20, and the remaining 60,000 or so are adults.

It is obvious, however, that most of these members are not easily active, since the clubs possess only about 500 planes, nearly all Stinson trainers, and about 1,300 gliders. Also, of the 450 clubs only 250 or so are really flourishing.

The government for a number of years has recognized the importance of the air-club as pre-training for military aviation, and also as a beneficial service for youth. Club members when drafted for military service are automatically enlisted in the air arm, and a program of specifically pre-military instruction is now being worked out with the clubs, with emphasis on formation of personnel.

Because of its interest, the government has poured out no interest to the clubs, besides organizing the national and sub-regional centers of its own for aviation. Light licensing in 1945 the government appropriated \$15 million to promote the clubs their present flying equipment. This equipment is, in fact, all in loan to the clubs, so the clubs that they will employ 25% of its flying time to give first lessons to young people. The government also pays for the complete overhaul of the planes at the factory, after 200 hours. Immediate overhauls are done by the clubs.

FINANCIAL

Airlines May Seek More Funds By Means of Public Financing

Further offerings likely with improvements in general credit; Western receives RFC loan; Atlas may underwrite Northeast issue; others needing capital.

With any sustained improvement in current ratings, the airlines may attempt further public financing at the earliest opportunity. The need for additional capital has long been evident but recent circumstances have mitigated against large scale public underwriting.

Western Airlines may represent the first carrier to act in motion a new series of capital facilities. The company has just received a \$4,500,000 loan from the Reconstruction Finance Corp. Changed circumstances make this possible. Previously, the RFC indicated that it would grant this advance if the Civil Aeronautics Board would approve the sale of Western's AM-65 to United for \$3,750,000. The CAB refused to purport the sale and only after its decision was made, was the RFC free to continue the various procedural steps necessary to make this loan.

The significant matter that with Western's recently received hopes for a loan, financial assistance was more readily available. Similar assistance on a private for almost any other airline now is in the air of additional capital.

Not Yet Moved—The RFC loan to Western reflects an "easy money" policy on the part of their agency toward the airlines. The loan is for a three year period and carries a 4 percent interest rate. Amortization payments are provided at the rate of \$125,000 monthly for the first six months, \$75,000 each for the second six months and the balance payable at maturity. Payment has been secured by the various assets of Western and is probably far more restrictive than borrowings made from private banking sources in normal periods. It is likely that the RFC loan may be a temporary relief and that Western can provide more favorable long term financing. It is also interesting to observe that this government loan will merely refund Western's present debt and leave a small working capital balance.

Trade sources report that Northeast Airlines may seek under a convertible preferred stock issue to obtain \$1 million or more. It is pointed out that the Atlas Corp., which presently owns 30 percent of Northeast's common stock, will underwrite the new issue. In the interim, it is believed, Northeast will have received funds to repay total loans and advances made by Atlas Corp. estimated to aggregate more than \$1,500,000. In fact, Atlas may be trading one type of security for another. Presently, the exchange will give Atlas a new structure type of security which it may well more readily to any interested buyers. In view of the Atlas Corp.'s interest in Consolidated-Vulcan, it may only be a question of time before it is required to dispose of the Northeast investment.

Funds Needed—A number of other airlines, particularly the smaller and marginal lines, are in desperate need of additional funds. But so public financing of airlines has been a basic improvement in general airline credit. A number of management are pressing for higher passenger fares as a means of improving revenues and bolstering earnings. Accompanying this drive, but less pressed with greater intensity, is the almost universal industry-wide request for higher fuel compensation. Then for American and Northwest are the only airlines who have obtained from airlines for more than one year.

The need for additional capital will be particularly acute for many lines actually to survive and to maintain competitive positions. For instance, the well-known carriers are proceeding with new equipment acquisition programs. On the other hand, competitive lines, less fortunately situated, continuing to operate DC-3s and DC-4s, aircraft, will be placed in an even more serious disadvantageous position. This will mean the continued operation of relatively high cost equipment and loss of traffic to the far more modern and less costly planes in service on competitive lines.

Continued Dwindling—Further—The continuing need for additional capital by the airlines continues to compound

many other factors. This problem appears to have new capital needs in fact, as well as the need for marginal carriers. The major trunk lines who recently completed major pieces of financing have been using the capital markets. United Air Lines, which is recently in February of this year closed a new \$7.7 million in new funds, was reported as exploring the possibility of securing additional capital. However, this problem appears to have been indefinitely postponed with the termination of its contract with the Glenn L. Martin Co. for the purchase of 50 5-4-3s involving a capital outlay of about \$15 million.

United has a bank credit of \$15 million and is believed to have a line of credit about half of this amount. The company's purchase of Western's AM-65 and assumption of the standard DC-3 contracts has been one factor in increasing its capital credit position. Of greater importance, however, is the growing construction costs. Perennially, United recently reported that UAL's Chicago base, originally estimated to require \$750,000, has risen about \$2.1 million and is only about 70 percent complete. Increasing costs in line with cash have upset building programs in all industries and but the airlines particularly hard, as the group is in great need of expanded facilities. This merely serves to postpone vitally needed construction projects.

Other Lines—American Airlines, which less than two years ago raised some \$80 million in new funds, may extend additional financing proposals next year. It is expected that the \$100,000,000 bond issue will be delivered at that time.

Northeast Airlines has indicated that it does not propose to draw down any part of its \$15 million bank line this year.

Of all the major carriers, Eastern is probably the only one which may actually have any public financing during the next 18 months or so. This company has a \$100 million bank credit in the amount of \$20 million which may adequately service its capital needs in the immediate period ahead.

It is a certainty that as a period of sustained earnings is attained by the separate carriers, opportunities will be realized for various forms of financing. The RFC may be expected to become more active in this direction. However, some concern does exist that the RFC will impose strict limits on any new government financing. Further, on all such credit granted, CAB approval in various forms must be obtained, that calling for an involved and costly procedure. In the final analysis, the best source of additional capital and that with the greatest possibility of flexibility will result through self-financed financial channels.

—Selig Altschul

WHILE WE DELAY—

Russia Drives for the Atlantic

IN THE STRUGGLE to keep western Europe west of the Iron Curtain it is *later than you think*. Unless the United States quickly mobilizes its own and other nations' resources, World War II will be lost as World War I was lost—by no economic follow-through.

Millions of people in western Europe, living in cold homes or no homes at all, face another winter of near starvation. Some countries are absolutely without dollars to buy abroad the food and fuel they need for survival. Others slide toward that desperate state.

In that winter of misery Russia grips for domination over all Europe. Everywhere, as cold and hunger deepen and as men begin to doubt America's determination to help, Russia turns on the pressure. In France the Communists drive to overthrow the Government. In Italy they do likewise. In Greece Russia kills the United Nations investigating commission. In Trieste Tito elbows us out of the way. In Germany and Austria the Soviet commanders alternately stymie and flout the Allied governments.

FACTED WITH this bloodless attack, the leaders of western Europe and of the United States have not covered themselves with glory.

Look, for example, at what the sixteen European countries participating in the Paris meetings on the Marshall "plan" first proposed to the United States as a catalog of their needs. In the main it was simply an adding up—to \$34 billion—of what the various countries thought they needed to keep going in the same old way at the same old speeds. There was no real start on plans for the mutual aid by European states which is the essence of a successful recovery program... no real start on plans to knock down the barriers which divide European trade into hopelessly inadequate little pockets... no real plans to clean up currencies which deterrence so fast nobody wants to work for them. In fact no plans to make people want to work.

Meanwhile, what have our leaders effected? Not much more than one fine commencement speech by

General Marshall, outlining a good idea, and a couple of outbreaks of statistics, with more to come.

Not even a beginning has been made on the most crucial part of any European aid program—that of explaining to the American people what their part must be and why. It is true that not all the reports of all the statistical committees have been completed. They never will be. But it is also true that the broad outlines of what the United States must do to save Europe are already clear. And it is not simply to provide more dollars, although \$12 to \$16 billion more—the cost of 4 or 5 weeks fighting in World War II—may be required.

A far more basic requirement is leadership which will lift Europe out of the slough of despair and get recovery rolling. Without that leadership more billions for Europe will buy us nothing but more bitterness and remorse on both sides of the Atlantic.

WHAT ARE the ingredients of that leadership? Here are a few:

1. A bi-partisan program for European recovery.

It should be so thoroughly understood and so overwhelmingly supported by both parties that playing politics with it will be like selling military secrets to the enemy.

Truman and Vandenberg have failed miserably to develop and explain a complete program—one in which Europe and America can have full confidence. Nor have Taft and Dewey and other candidates for high office pledged that politics will stop at our shoreline. There men must speak out. To date Herbert Hoover alone has had the courage and vision to state a program.

2. A mobilization of American food supplies.

We must assure people at home and abroad that our crops, cut down by drought and pest, will be stretched to cover minimum European needs (with whatever help we can receive from other sources) without forcing still higher food prices here.

Some food experts are comfortably confident that the stretching can be done. But

question—*and*—wheatless days, higher rationing of flour from wheat and similar voluntary conservation moves would make it sure. And they would demonstrate that a free country can mobilize itself to meet a very serious crisis.

3. An understanding that relief is one problem and recovery another.

Both problems must be solved. Relief emergency must be met, some of them at once. But they must not block out the longer task of recovery. Italy illustrates the point. Italy, particularly the south, is fast broken. Help is needed right now to keep people from dying in the streets. But we must eventually do more than keep the Italian people alive. We must help them get back to useful work so that they can stand on their own feet.

4. A steady insistence on results—which means that Europe must find a way to make its people want to work.

In the U.S.S.R. they have a way to get things done. It is to legislate those who do not work. In the U.S.A. we have a way to get things done. It is to create incentives to make people want to work. Western Europe, notably France and Britain, has fallen between two stools. It has socialized away the incentives, and it does not yet, thank heaven, enslave the laggards. We should make it crystal clear that we have no designs on the national "sovereignty" of others. But we should make it equally clear that we must that these countries which recover our aid work hard enough to get results. To this end continued aid should be on an installment plan, each installment conditional on getting results. Otherwise more billions can easily disappear down the drain.

5. Insistence on all-out self-aid by European countries.

That is the constructive core of the Marshall idea—to help Europe to help itself. In his brilliant "Report on Germany" and how to get it "off the backs of the American taxpayer," Lewis H. Brown, John-Marcville Chairman, shows how the export of only 10 million tons of coal a year from Britain to western Europe would speed industrial recovery of the Ruhr immeasurably. There are countless other cases where effort in one European country—or a group of countries

—will break a big industrial bottleneck in another. We should meet that everything possible be done to see they are broken.

6. An agreement with Britain and France giving us authority in western Germany equal to our responsibility.

Britain is shifting to us most of the financial burden she has been carrying; is the German occupation. Less directly we shall also be carrying much of the French occupation load too. We must have authority in the economic field commensurate with our responsibilities. Otherwise the management of western Germany can pass Anglo-American and Anglo-French relations in addition to wasting resources we could use to promote general European recovery.

It is truly said in the scriptures that the Lord leaveth a cheerful giver. But it is not recorded anywhere that anyone, including the recipient, knew a self-handed giver. Hence as a capstone to a program of aid for Europe should have machinery assuring that only what is needed is sent; that what is sent does the job for which it is sent; and that arrangements are made for the recipients to pay back whatever they can.

THE AMERICAN PEOPLE should be told clearly by their leaders that there is no assurance that the best possible program of economic aid for Europe will do the job. The time is very late.

In France and Italy, as our help falters, the Communists right now are provoking strikes which will make the people's suffering more acute. They hope, of course, to overthrow the governments in both those countries and to seize control. If Communist detachments are charged on France and Italy this fall, Russia and her satellites will have advanced to the Atlantic. The Iron Curtain will have moved 300 miles west—toward us.

Americans should be clearly told, therefore, that not to undertake an immediate program for the recovery of Europe is to bring about the greatest possible national disaster—World War III.

James H. McEraw, Jr.

President, McGraw-Hill Publishing Company, Inc.



JET SCHOOL

Aviation personnel from Wright Field receiving an explanation of the operation of a centrifugal compressor during Donald E. Thibault's jet school recently established by General Motors Co. at its aircraft gas turbine division, Lyons, Mass. To date more than 250 men from Army, Navy, GAA, NACA and aircraft companies have enrolled in the school, which has several courses tailored to particular requirements of the students. (Wide World photo)

Fairchild Reports Largest Peace Profit in Company History

Net income of \$962,047 bolstered by \$657,039 operating profit; C-82 sales are 84 percent of total.

While reporting for 1946 the largest peacetime profit in its history (and one of the few in the industry for the year), Fairchild Engine & Airplane Corp. reported to complete the most June the C-82 Packet contract which accounted for 54 percent of 1946 sales, the annual report disclosed.

Caring about to fill the gap, the report states, is the Packet's successor, the Wings Major-powered C-119A, which may be the four-engine, detachable fuselage cargo plane on which it is known Fairchild is working.

Operating Profit-On sales and other income of \$48,951,875 in 1946, Fairchild lost an operating profit of \$699,035, only slightly below its operating profit of the previous year for 1945. In 1945, only three other major companies (North American, Martin, Grumman)

reported operating profits.

By manufacturing \$501,000 from its greatest postwar product, Fairchild showed net income of \$962,047, considerably above the 1945 net of \$688,815. In only two years, 1943 and 1944, did the company's net income exceed the 1946 figure.

Packet deliveries in 1946 totaled 79 (by Aug. 31 of this year, 144 had been delivered). Progress toward completion of the Packet order is reflected in the company's backlog figures. About \$51,000,000 at Dec. 31, 1946, and approximately \$78,000,000 on Aug. 31. Of this amount, 75 percent is held for military production, with commercial production five percent, and military research and development, 17 percent.

Personal Plane Problem-Fairchild's personal plane plant is in doubt. Of

the 300 F-24s built by Teas Engineering and Manufacturing Co., Fairchild sold 173 in 1946, according to the report. The report states that plans for production of the new F-47 "will meet CAA certification and interim development in the personal aircraft industry." From other sources it is understood that the F-47 program has been delayed pending replacement of the original fuel pump which proved, without inquiry to the pilot, during a test flight, and until the release of the F-24s are sold.

In connection with many other aircraft companies, Fairchild undertook a certain amount of reorganization work after the war. The experience has been "unsatisfactory," President J. Carlton Ward, Jr., says in the report. Fairchild completed several months ago a sub-contract for the production of four-wheel vehicles for a top marine base, but "various matters in connection with this order are still in dispute." Disputed discussion was manufacturing contracts for radio firms until setbacks and cancellations last spring, and Fairchild is now engaged in litigation with one of the former customers. Disputed claims are now in litigation.

Due Strains Corp.—Fairchild has now acquired 100 percent ownership in Stratus Corp., of which it previously owned but 50 percent. Stratus had \$52,593 in 1946 and has suspended operations on its main commercial order for preproduction equipment, but is pursuing other projects.

Fairchild's net working capital at the end of 1946 was at a new high of \$11,010,875, of which \$4,815,091 represented cash, and \$5,195,785, net assets. Compared to some years, even paucity in this industry, this can be considered a very favorable inventory ratio since much of it presumably is for the Packet.

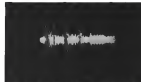
Convair is Pushing Transport Production

Consolidated Vultair's Convair has passed CAA subsidy tests, and as AVIATION WEEK went to press it was in final stages of aerodynamic flight tests. Two tests had been initiated, with one successfully completed up to 900 mph.

Convair was expected to continue packing Convair production pending completion of certification flight tests. Two buildings of the company's San Diego plant now are in full fabrication of the transport, and 40 plans, including those recently completed, are in use and final assembly.



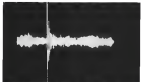
SPARK PLUG NORMAL: Scope in the photo shows the pattern when a spark plug is tested and is functioning properly. Various faults, such as shorting, too large or too small gap, produce distinctive patterns.



ENGINE CYCLE NORMAL: Properly functioning cylinder produces this pattern on the scope by providing substance from each of the four main sections (left to right), exhaust closing, injection, intake closing and combustion.



SPARK PLUG FOULED: The pattern of a fouled plug looks like this for a normal plug, but changes to a dead short. Excessive changing of the fouling resistance with each firing causes the fluctuating variations.



ENGINE CYCLE OFF: This pattern records result of no exhaust valve seating properly. It is easily spotted by small size of the exhaust, left gap. Injection is off-timed and combustion is absent. Only the intake is normal.

Engine Analyzer Pinpoints Flight Trouble

Instrument furnishing positive indications of a variety of failures aids safety and minimizes servicing delays.

An electronic engine analyzer capable of spotting a variety of engine troubles while a plane is in flight has been put into production by Sperry Gyroscopic Co. After years of development in a cooperative industry venture and thorough testing in airline operations.

With it, a plane's crew can pinpoint quaterns or combustion failures, and they have precise information on which to base the flight pattern, and also be able to advise the ground crew, after landing, of the exact nature of the trouble and thus speed servicing.

The analyzer is the result of collaboration between twelve agencies, engine builders and Sperry, and was recently demonstrated at a conference sponsored by Champion Spark Plug Co. Flight tests have been conducted by Pan American Airways on various flights of Lockheed Constellation. Depending on the type of malfunction, the analyzer can cost about \$3,500, weigh about 40 lb.

Many-Save—Oftenly installed with the development of the device estimate that the engine analyzer saves one day's loss of service for a plane it will more than pay for itself. Plans such as the Constellation line up to \$4,900 a day out of service, larger planes such as Republics B-47s and Boeing Stratojets more than \$10,000 a day.

These latest planes have 224 spark plugs that have to be checked. The flight analyzer will check them all in a few minutes, not just on the ground, but also at high altitudes and during climb and after actual flight conditions when faulty wiring that cannot be located by ground tests.

A service it has demonstrated its ability to increase safety by indicating with an advance the development of engine trouble, thus enabling the flight crew to take such action as to cut attention. In addition, by indicating

the exact nature of engine operation, the analyzer permits more efficient engine care.

Two Functions—The electronic engine analyzer performs two distinct functions: (1) It indicates the condition of individual spark plugs through out the engine, and (2) it indicates the mechanical operation by detecting the vibrations they produce at each cylinder. Both these indications are produced on a single three-inch, medium persistence, green phosphor cathode-ray oscilloscope tube indicator.

The particular instrument is chosen by two switches, one selecting the type of indication, and the other selecting the complete engine or the particular cylinder of interest. The indicator and switches can be either mounted in the flight engineer's console or in a separate pedestal. The amplifier and other auxiliary electronic circuits necessary for producing the indications are in a separate housing that can be located anywhere about the plane.

A three phase generator is mounted on the auxiliary instrument drive of the

engine. The voltage produced by the generator follows the angular position of the crank shaft. By using this voltage (through an audio circuit) to control the sweep of the electron beam across the indicator, the signals displayed on the screen in their position relative to the crank angle.

► **Ignition Indication**—To display positions of the ignition system, the changing voltage at the magnets switch in the primary circuit is picked through an isolating circuit to the central deflection magnet of the indicator. Should a short circuit develop in the indicator circuit, the isolating resistor will protect the ignition system.

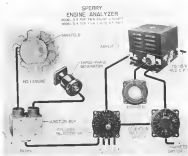
For observation of mechanical operation, indicator functions transmitted to the cylinder indicator units are picked up by magnification units screwed onto each cylinder. Thus no holes need be cut in the inside cylinder walls. A narrow field lens encloses these pickups in a tube that pitches through a protection box in the fuselage to the cylinder selector. The voltage selected is amplified and applied to the indicator.

Statistics of major engines show that engine troubles account for 20 to 50 percent of actual delays in flight departures. Using the ignition analyzer function, the flight engineer can observe simultaneously the behavior of all crank plugs in an engine as of one unit as the engine is warmed up. Any plug that functions improperly is immediately indicated and can be quickly replaced.

During flight, if a plug is observed to be faulty, the pilot can make corrective adjustments or change his flight plan for the sake of safety.

► **Cylinder Indication**—Various sensors inside the cylinder produce their own peculiar types of vibrations. The valves, in closing, produce short, sharp vibrations. If a valve closes too slowly it produces low vibrations. When it is closed normally, the piston indicating whether the valve is closed is the same as by the valve closing. Inception indicates short vibrations. Continuous production low vibrations, other engine operations usually low vibrations.

The engine analyzer has been developed through the cooperative research of John E. Lindberg, Jr. of Pan American Airways, engineer of Wright Aeronautical Corp., Chrysler Corp., and Sperry Gyroscope Co. General test facilities were provided by Wright when an experimental unit is installed for the first month and turning of various flight personnel. Clipping for the analyzer is being installed in Boeing Stratocruisers now under construction. Aeronautical manufacturers are interested in the equipment for their test beds. Thus, not only is the analyzer useful in flight but also in engine testing and development and for test technology.



COMPACT: Small size of the indicator unit is shown here in the position of the flight engineer's seat. It can be mounted in the console, or in a separate pedestal.

NEW! SELF-LOCKING

*Nylon Cap
Anchor Nut*

**UNAFFECTED BY
GASOLINE***



—The Red Elastic Cap and Collar is molded in one piece to prevent LIQUID SEEPAGE!

Gasoline cannot creep past the ball end sections inside the full sized nuts. This latest improvement is equipped with ESNA's latest development in self-locking, self-sealing nuts—the Nylon Cap Nut. The nylon cap and collar is molded in one piece. It is important in the absence of any of gasoline and many engine seals. The cap prevents and seals the end of the lock against liquid penetration. The Red Elastic Collar seals the joint and seals all the lock threads against liquid seepage. As in other Elastic Stop Nuts the ball end improves a full thread contact in the collar. This threadlocking action produces a compression, and helps

resist the pressure against both the top and bottom sides of the ball threads . . . that insures a full thread contact and a dependable tight liquid seal. Here again ESNA's Elastic Stop Nuts provide dependable protection against Vibration, Thermal Expansion, Thermal Fatigue and Liquid Seepage. ESNA's experience and research are always at the disposal of the aviation industry. For more details about ESNA's Nylon Cap Nut in low, low line, aircraft, engine and engine repair, address: Elastic Stop Nut Corporation of America, Union, New Jersey. Sales Engineers and Distributors in principal cities.



The RED COLLAR AND CAP—a new ESNA product

is flexible and dependably elastic. Every bolt—regardless of material—insures—insures (does not get in full thread contact in the Red Elastic Collar is fully grip the full threads. In addition, the Red Elastic Cap and Collar seals the nut threads—and insulates all metal parts between the bolt and nut.

All ESNA Elastic Stop Nuts—no matter of size or type—lock to provide compression in a bolt and nut. Vibration impact or stress reversal cannot disturb pretension in post-tensioned settings.



*The nylon cap and collar are made of a special polyethylene and are unaffected by gasoline and oil. They are also unaffected by other liquids and gases. They are also unaffected by other liquids and gases. They are also unaffected by other liquids and gases.

ELASTIC STOP NUTS



PRODUCTS OF: ELASTIC STOP NUT CORPORATION OF AMERICA

AVIATION WEEK, October 20, 1947

FEATHER-WEIGHTS

COOL MARTIN 2-0-2
AND 3-0-3 TRANSPORTS

The new Martin 3-0-3 is a highly advanced transport design, featuring a pressurized cabin for high-altitude flying and jet engines for added performance. It carries 24 to 32 passengers at speeds up to 300 mph. The plane, together with its new pressurized cabin, the 3-0-3 has been ordered in greater quantity than all other jets designed transport combined.



Marking an important step forward in air transportation, the Martin 2-0-2 and 3-0-3 represent a combination of many engineering achievements. Their FEATHER-WEIGHT all-aluminum oil coolers for example, were especially developed in the largest, most modern wind tunnel laboratory in the aeronautical heat exchanger industry.

FEATHER-WEIGHT all-aluminum oil

coolers are inherently light, strong, compact... withstanding the most severe conditions of temperature, pressure, vibration and shear which usually cause oil cooler failures.

Inquiries concerning FEATHER-WEIGHT oil coolers are invited. The Clifford Manufacturing Company, 561 E. First Street, Boston 27, Massachusetts. Offices in Chicago, Detroit, Los Angeles.

CLIFFORD

ALL-ALUMINUM OIL COOLERS

HYDRAULICALLY-FORMED BELLOWS



Extra Kick for Jet Engines

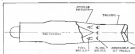


Fig. 1. Tail-pipe afterburner



Fig. 2. Liquid injection

Thrust Augmentation Offers Power Gain

Increase of 100% available through new methods of auxiliary burning at high speed; research revealed.

By ROBERT McLAUREN

The principal failing of the turbojet engine—its dependency on ambient air for work speed for high power and efficiency—may soon be overcome through the use of "thrust augmentation," the burning of additional fuel in the system. One of these methods, tail-pipe afterburning, offers 100 percent increase in turbojet engine thrust, offering a jet fighter twice its normal power for last acceleration in combat.

Nonetheless other methods, including water-injection, offer short periods in excess of up to 50 percent for emergency use. All of these gains, however, are available only at the expense of a greatly increased fuel consumption considered feasible only in high-speed military operations.

► **Jet vs. Propeller**—The low power not only of up to 50 percent for emergency use. All of these gains, however, are available only at the expense of a greatly increased fuel consumption considered feasible only in high-speed military operations.

► **Jet vs. Propeller**—The low power not only of up to 50 percent for emergency use. All of these gains, however, are available only at the expense of a greatly increased fuel consumption considered feasible only in high-speed military operations.

In the first place, the engine is designed for normal operations at about 87 percent of its maximum thrust, which provides a very narrow range of reserve power for takeoff or acceleration in flight. By comparison, the reciprocating engine is designed to operate at 50-60 percent normal rated power, and up to 120 percent peak rated power may be drawn from the engine for 5-minute periods. Thus, the reciprocating engine can provide from 100 percent to 140 percent excess power for takeoff over that required for steady level flight.

In addition, the propulsive efficiency of the turbojet engine is substantially lower than that of the reciprocating engine at low speeds. This efficiency is a function of the useful energy of the moving air and the energy wasted in the exhaust.

► **Efficiency Formula**—Thrust = $m(V_2 - V_1)$ in which "thrust" is the useful energy produced, in the mass, m , the speed of the engine, and V_1 the speed of the jet.

$$\text{Useful energy} = \frac{1}{2}m(V_2 - V_1)^2$$

$$\begin{aligned} \text{Propulsive efficiency } \eta_p &= \frac{m(V_2 - V_1)^2}{2(V_2 - V_1)} \\ &= \frac{V_1(V_2 - V_1)}{2(V_2 - V_1)} \\ &= \frac{1}{2} \frac{V_1}{V_2} \end{aligned}$$

If it evident a large value of $(V_2 - V_1)$, the change of velocity of the air, produces a low value of η_p , propulsive efficiency, whereas a low value of $(V_2 - V_1)$ produces a high efficiency. The reciprocating engine drawing a propeller produces a small change of velocity in a large mass of air, thereby causing high efficiency. The turbojet engine depends on a high change in velocity of a small mass of air in the jet and, therefore, creates low efficiency.

These considerations indicate the necessity for some form of auxiliary power for a turbojet engine powered aircraft to provide the high power and efficiency demanded for takeoff and high acceleration during flight or in critical maneuvers such as the "zoom climb" from an aircraft carrier.

To obtain the extra power, the Air Force, Navy, aircraft engine and aircraft manufacturing industry and the National Advisory Committee for Aeronautics are exploring several methods.

► **Tail-Pipe Afterburning**—The principal operating limitation in a turbojet engine is its critical turbine inlet temperature. This temperature is determined by the amount of heat which the turbine blades are fabricated, the speed of the blades to which they are attached and the size of the turbine and its blades.

In order to prevent this temperature from exceeding its safe value, an excess



Fig. 3. Jet engine.

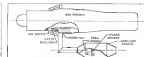


Fig. 4. Auxiliary burner.

very large quantity of air is handled by the engine to cool the combustion gases. It is not unusual for a turbojet engine to use four to six times as much air as is actually required for efficient combustion in driving the turbine. The excess being produced by the combustion chamber. After leaving that place and the hot gases pass through the turbine, hot gases are as passed out into the atmosphere in the form of wasted energy. Tail-pipe after-burning (Fig. 1) attempts to make use of this excess air.

The hot gases leaving the turbine pass through a diffuser, which changes velocity energy to pressure energy and slows down the gases to permit additional burning in the tail pipe by introducing hot through a spray ring or a series of spray nozzles. An adjustable fuel pump is required to accommodate the increased mass flow.

Since the after-burner does not affect the turbine blade temperature, after-burning can limit the gases to a much higher temperature than is permitted in the combustion chamber of the turbine. The addition of the fuel in the tail pipe increases the mass of the jet gases and the burning increases the gas temperature, thereby producing higher jet velocity.

Both of these accessories produce greater thrust up to 40 percent during takeoff and up to 100 percent at high altitude speeds, according to recent test results. After-burning requires a fuel-suction speed of fuel and, for this reason, its use is limited to takeoff or for emergency only.

Liquid Injection-Turbojet engine thrust may be increased by the injection of water into the combustion chamber (Fig. 2). (That water is usually used with alcohol to prevent its freezing at high altitudes.) This increase is limited by two factors:

Lower temperatures.—Evaporation of the water in the compressor causes it to lower the temperature of the air during its compression. This provides an increase in the compressor pressure ratio because it means slightly superheated compressed compression. The higher compression chamber pressures also produce higher jet velocities, resulting in greater thrust.

Increased mass flow.—The decreased compressor outlet for combustion inlet temperatures permit the burning of more fuel with attendant increase in mass flow without exceeding the critical turbine temperature.

Water injection is limited in its effectiveness at a three engine installation by the amount of liquid that the air in the compressor can absorb without resulting in ice formation. However, thrust increases of the order of 30-55 percent have been obtained in tests, with a figure of 53 percent possible.

Jet Injection.—The small mass of air accelerated by the turbojet engine may be considerably increased through the use of single or multi-stage ejectors, convergent-divergent nozzles (stators) to the turbojet tail pipe (Fig. 3). This system draws additional air from outside the engine and injects it into the jet through expansion of the hot gases within the ejector.

A properly designed system can provide thrust increases as high as 25 percent at low speeds (such as during takeoff) and 50 percent at high speeds. It can also be used to cool the engine by drawing the air through a duct surrounding the engine. (This system is used in the Conquest Lear for cooling of its turbojet engines.)

Principal disadvantages of this system are the weight and cost of its installation and the fact that it does not provide added thrust for sudden bursts of speed without an extremely complex design incorporating a retractable ejector with expanding tips.

Auxiliary Burners.—The engine air, previously mentioned, may be utilized by directing it into additional combustion chambers (Fig. 4). In this system, about 20-30 percent of the air delivered by the compressor is bled off and ducted to a separate combustion chamber. There the air is mixed with fuel and burned at a higher fuel/air ratio than in the main burner. Because of the high pressure and temperature permitted (the hot gases do not pass through the turbine) jet velocity may be increased. The mass flow through the turbojet engine is not limited by the turbine nozzle area and increased mass flow may be used. Water is usually injected into the main burner in conjunction with the main jet of air bled from the auxiliary chamber.

Large amounts of thrust depending upon the number and use of auxiliary chambers and can be added in this manner. However, it requires the addition of complex equipment to the engine, the combustion chamber, water injection equipment and additional fuel system equipment. This method is also extremely heavy.

Jet Assisted Take-Off.—The function JATO unit, which has been used on both military and commercial aircraft in a large variety of types, consists of a powder rocket which is fired when additional thrust is required. Powder rockets, however, cannot be controlled once they are ignited and they must burn through to extinction before the additional thrust ceases. Experiments are now under way utilizing liquid fuel rockets for this purpose, the thrust from which may be varied and accurately controlled by valves in the fuel supply system. An important one will be sodium azide, or thrust jet accelerating through the sonic speed engine.

Auxiliary Turbojet Engines.—By mounting additional turbojet engines on large air aircraft, the required thrust increase either for takeoff or for high speed acceleration, can be provided either on jet aircraft or those converted by replacing engine-propeller combinations. These auxiliary engines can be smaller than the main engines and a typical example is the Douglas XE-414 demonstrator, which, in addition to its own turbojet propellers at the tail, mounts two Wright-Patterson 1850 turbojet engines under the wings.

In order for a thrust augmentation system to merit wide application it is necessary that it be a means of increasing air weight, drag and maintenance complications. From this point of view the water-injection injection system offers the greatest immediate promise for comparatively small increases in thrust and the tail-pipe after-burning system for maximum thrust increase.

Both of these systems produce greatly increased fuel (or liquid) consumption with required tail-pipe weight and space but for short bursts of power they are serious. Both systems are flexible in operation providing a wide range of augmentation values to meet specific tactical needs.

NACA is actively working on both of these systems in an attempt to reduce the fuel consumption and improve their efficiency. It is also giving consideration to the auxiliary burner system with particular emphasis on reducing its complexity.

All of these methods are designed to accommodate deficiencies in the turbojet engine itself and are, therefore, comparatively temporary expedients. It will only be through the development of the turbojet engine that really no part of the engine or thrust flexibility will be affected and it is in this field that the greater portion of the research and development effort is being directed.

Plastic Glass Developed Suitable for Airframes

Research at Northrop and other aircraft firms has yielded the possibility of manufacturing aircraft components from aliphatic polymers laminated with fibrous strengthening plastic resin.

Certain large aircraft parts have already been fabricated from these plastic laminations and it is believed that before too long some manufacturing will successfully construct an entire airplane through this method. Recently, the vertical stabilizer of the Martin 244-1 of the Douglas Aircraft Co. was fabricated.

Advantages offered include simplified production methods, greater vibration dampening, greater strength weight ratio in relation to stress, and positive safety, since plastic structures do not retain dents.

NO OTHER PROPELLER gives all these advantages

- UNWOBBLING CONSTANT SPEED CONTROL
- REVERSE THRUST
- WATER-SEAL CHAMBER
- SELECTIVE SPEED RICH
- LOW DRAG
- THERMAL SHOCK (Control in Steel etc.)

EVERY FEATURE PROVED AND IN SERVICE

CURTISS ELECTRIC PROPELLERS

PRODUCED BY PROPELLER DIVISION CURTIS-WRIGHT CORPORATION, PHILADELPHIA, PA.

ALL-TEMPERATURE RELIABILITY • MAXIMUM EFFICIENCY • FLEXIBILITY OF MAINTENANCE

7 NEW SKIL DRILLS*



...with 7000 uses in your shop!

* These new Skil Drills are compact, lightweight and perfectly balanced... so handy as to make jobs that it's almost impossible to imagine their usefulness. And like all Skil Tools... the 200 Series Skil Drills represents the latest developments in Skil Tool engineering, design and craftsmanship... your assurance of top real value per dollar invested. See your Skil Tool Jobber today!

SKILSAW, INC., 5033 Elston Ave., Chicago 30, Ill.
Factory Branches in Principal Cities
In Canada: SKETOOLS, LTD., 44 Portland St., Toronto

SKILTOOLS



SEND FOR
FREE FOLDER



MODEL 242
1/2 In. Heavy Duty



MODEL 241
1/4 In. Standard



*200 Series are made exclusively
by SKILSAW, INC.

NEW AVIATION PRODUCTS

Self-Lock Nut for High Heats

Model self-locking hexagons nut, produced by **Boots Assault Nut Corp.**, Stratford, Conn., and recently awarded AN approval, is all steel one-piece unit made to combine maximum resistance against vibration with saving tungsten as consideration (up to 450 deg. F. in

then a nut). In operation, pistol is fitted over flange and secured by thumb-actuated break lock. After flange is loosened, release of break lock allows spring to drop out of pistol. Manufacturer is **International Film Signal Div.**, K4100 Mfg. Co., Westerville, Ohio.



strength range). Loading operations at cost of nut give spring action and produce vibration-proof grip on threads of bolt. Standard test flexions are undergoing government tests.

Flare Kit for Personal Flyers

Saving in weight and resistance in cost are reported features of portable flare kit now available to give personal plane flyers the protection of emergency landing flare. Approved by CAA for night operations, it places up to 3,500 lb. gross weight, but includes five 1 min. flash flares and a 37 sec. flare pistol packed in given instant waterproof flare container, the whole weighing 11 lb. Each flare guarantees over 75,000 ft. per min.



rating from 100 to 20,000 cfm. Resolution of instrument is moved better than 1 deg. in range of resistance over 5,000 ohms. Maker is **G. M. Giannini & Co.**, Pasadena, Cal.

Oil Conditioner vs. Engine Wear

Lubricating oil conditioner units for use on internal engines are now offered by **Whitely Engineering Co.**, Oakland, Cal., which states their devices reduce present plant wear and maintenance and overhaul costs. Initially available in three sizes for substitution on engines up to 150 hp., conditioner incorporates company-designed element giving progressively finer filtration of oil as it passes from outside of element to center core. Material is explained that neutralizes acids and removes water without



affecting dielectric in compressed air. Process continues all at original quadrants, and filtering makes for clean materials and oil pump free from sludge, carbon, and dust particles. Dry weight of unit ranges between 21 and 34 lb., according to size of filter. CAA approval specifies use on engines with maximum oil pressure of 55 lb., and installation is to be as direct as unit with mounting in reinforced vibration using flexible metal and solder joints. Photo shows machine replacing filter element in conditioner fitted on 71 hp. engine.

Guided Missile Vacuum Tube

Vacuum tube for high voltage operation at heights up to 50,000 ft. is announced by **Ampex Electronic Corp.**, 35 Washington St., Reading, N. Y., the unit being particularly intended for control circuits of guided missiles. Developed through sponsorship of Air Materiel Command, tube is a high-voltage half-wave rectifier rated at 14,000 v. peak inverse. It can deliver an average plate current of 325 ma. and a peak plate current of 750 ma. Though rated at only 14,000 v. peak, tube rectifies negative peak-to-peak voltages as high as 55,000 v. To make more secure installation is divided of all air (which at high altitudes causes flash-over between terminals), tube's base is shaped like glass bottle stopper. Six air flow elements under name of **Whitely**, a bonded glass tube composition which will not carbonize.

Waxing-Type Aircraft Cleaner

New type aluminum and metal cleaner for use in aviation field is **Wax-Ball**, a chemically integrated cotton waxing designed for direct application to metal surfaces. Superior luster with less labor is claimed to be possible with product, which is stated to act as solvent for all petroleum substances, including tar, wax, and oil. It is also described as removing rust, leaving a protective film. This cleaner is introduced by **The Health Co.**, 116 Broadway, New York 7, N. Y., which is an aviation consultant and engineering firm acting as sole distributor for rubber, George Bush Co.

Douglas DC-4 Lubrication

Simplified by Sinclair



Sinclair's popular DC-4 Lubrication Chart, based on 15 years of practical experience, is a major step toward simplification of aircraft lubrication. It enables maintenance crews to do a thorough, safe, commendable lubrication job on every mechanical detail of the giant DC-4's, with just four lubricants!

In this way, lubricant inventory is held to a minimum... maintenance costs are kept appreciably lower. Write for your free copy of this useful, time-and-money saving DC-4 Lubrication Chart.

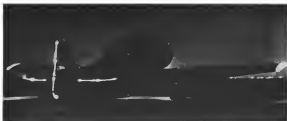
SINCLAIR AIRCRAFT OIL *Symbol of Flying Dependability*

Commercial airlines, private fliers, and aircraft manufacturers have found top-quality SINCLAIR AIRCRAFT OIL just as dependable in peace-time aviation as it was proved to be in bomber, fighter, and transport engine lubrication during the war.

The high regard in which engineers of major airlines, using famous DC-4's, hold SINCLAIR AIRCRAFT OIL speaks for itself. For safe, sure aircraft engine lubrication, go with the DC-4's — go Sinclair.

SINCLAIR

SINCLAIR REFINING COMPANY, AVIATION SALES
430 FIFTH AVENUE, NEW YORK CITY



Navy Develops Novel Airplane Lighting

Use of Plexiglas and Lucite illuminated by internal lights combats night flying problems.

After three years of extensive experiments at the Aero Medical Research Laboratory at Philadelphia, the Navy is securing tangible results in efforts to improve identification lighting of aircraft to make night operations safer and more efficient.

The critical nature of the problem has been pointed up by the Navy with authentic accounts of pilots at night flying "formation on a star," and at least one case in which a student pilot crashed after following the red tail light of a truck under the illusion it was another plane.

To eliminate that, and other types of confusion, the Navy is now developing pilots with three planes at Philadelphia, each employing different arrangements of external lighting, to arrive at the best system and to require suggestions for further improvements.

In addition to the external lights, these planes have new types of cockpit and instrument illumination.

► **Automatic Illumination**—Much difficulty the work is directed toward overcoming is what is known as "autoluminescence." Simplest explanation of this effect is that if a person is in a dark room in which there is only one small light, and he focuses his gaze on it, in a short time the light will appear to vanish. The illusory movement will vary—sometimes, minutes at erratic patterns. On a dark night, a single light on an airplane will create the same effect for an observer. The illusion can be eliminated by the addition of one or more lights.

The experiments at Philadelphia, under the direction of Capt. J. R. Pappas, Navy Medical Corps, have established that the flicking arrangement of lights used on conventional planes is "an effective means of making the plane distinctive and of allowing an observer to determine its distance and direction."

► **Northern Notation**—However, such lights do not fully meet the needs of night operations, particularly formation flying. They are point lights, illuminating specific areas only and not giving clearly definition as to the plane's attitude and orientation.

True objective, as outlined by Dr. Pappas and Lt. H. G. Wagner (also of the Medical Corps and working on the project) in a paper before the Aero Medical Association is to develop external lighting for visual reference that will have positive meaning to another pilot even under the extreme conditions of flight. Best answer appears to be the illumination of certain areas or contours, rather than certain points.

Various methods of providing positive cues of depth, size and speed by means of illuminating characteristic areas and contours were tried, using brightness levels close enough to not change, but rather accentuate the lines of the plane itself. Definition of the tail by illuminating the cowling of the trailing edges of the rudder and elevator provide a unique peripheral configuration from rear position observed. The profiles of the horizontal lines of the cowling to the vertical line of the tail

also present an inverted "T" appearance to positive as to appear to have exceptional value.

Another area of importance, Pappas and Wagner report, is the actual shape of the wing.

► **Wing Is Reference**—The wing itself is a good visual reference to pilots since its movements are easier than other parts of the plane, giving information as to change in orientation quickly. However, the true edge of the wing is difficult to see at night. Tests indicate that pilots find an illuminated wing to be more definite, hence more comfortable, visual reference in night flying.

The use of Lucite, Plexiglas or other suitable plastics capable of being illuminated by internally reflected light possess novel advantages for this method. It can be shaped and molded to any desired shape with relative ease, yet is tough and durable for adequate structural strength.

A complete wing tip was fabricated so that it contained two typically separate portions. The leading portion is clear and contains a standard position light, similar to that used on the P-51. The remainder has been molded on the inside so that no small lamps will create confusion in this action. Each portion can be illuminated without affecting the other. The appearance when illuminated at night is that of outline shaped like an arrow.

► **Brightness Chosen**—Following actual flight tests, two brightness were chosen, a full bright position giving a



BERRYLOID The Standard of Excellence
in aircraft finishes

For durability, protection and beauty . . . Berryloid Aircraft Finishes have been the *standard of excellence* in all types of plane finishing for over 30 years. It's only natural, then, that Berryloid is the choice of most of the nation's leading aircraft manufacturers . . . the reason why many of the new planes you see are protected by Berryloid Aircraft Finishes.

For new planes on the production lines and in the maintenance of planes now in use . . . Invest upon the protection and beauty of Berryloid Aircraft Finishes.

*Berryloid, for maintenance and refinishing, is nationally distributed by AER ASSOCIATES, INC.

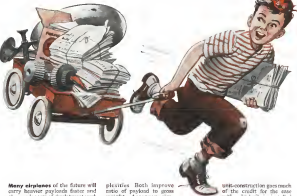
BERRYLOID
AIRCRAFT
FINISHES

BERRY BROTHERS, INC.

Beane
Ingleside, Cal.

New York • Cleveland • Chicago • St. Louis
Minneapolis • Winnipeg • Toronto

Turn those waste pounds into dollars!



Many airplanes of the future will carry heavier payloads faster and cheaper because of lightweight work aided with Aeroprops today.

With its strong, hollow, stiff-ribbed blades and completed unit construction, the Aeroprop offers demonstrable weight-saving advantages. Moreover, being hydraulically actuated, there are no supplementary installations to add further weight and design com-

plexities. Both improve ratio of payload to gross weight. Aeroprop simplicity, moreover, assures dependable, long life, while its

light construction gets much of the credit for the ease with which it is installed and serviced.

We're busy now, designing these characteristics into Aeroprops custom-tailored to meet requirements of airplanes yet to fly. Turn today to Aeroprops—backed by the research and production facilities of General Motors—for answers to your future needs.



Aeroprop

WORKING PROPERTIES FOR AIRCRAFT TODAY
DESIGNERS FURNISHING TO MEET TOMORROW'S NEEDS

This is the Aeroprop—our latest simple dual-operation unit (instrument-bearing, advance path, electric de-icing, and all-weather beam-type) for any instrument. Repetitive, built and blade assemblies are designed for unit installation or replacement. It is strong, light and simple.

AEROPRODS DIVISION • GENERAL MOTORS CORPORATION • DAYTON, OHIO

surface brightness of about 15 millicandelas is added for emergency and emergency power procedure, adjustable to a wing by up to a distance of several hundred yards. For formation flying a much lower brightness of about 60 millicandelas, is not necessary at close interval flying. Color is eliminated and mostly the "green" of the aircraft itself is enhanced by this illumination.

Light Trough Lamps—The method of corner lighting outlining the tail wing edges of the rudder and elevator makes use of the fact that light is conducted through curved bore. Light strips were absorbent and fitted to the trailing edges of the rudder and elevator of an SNJ intermediate trainer aircraft. Flatter lens indicates that aerodynamic characteristics of the elevator and rudder are not seriously affected.

Illumination is provided at each end of each bar by small lamps in light trough housings. The Lamps are secured in graded fashion so as to give the bar a uniform brightness. When illuminated and observed from the rear, one sees lines of light wherever there is a Lamps.

Experiments indicate the unit has a distinctive appearance when seen at angles up to a side. The apparatus is particularly useful in facilitating recognition and rapid sign-off.

There is little difficulty in absorbing this inverted "T" appearance against a confused background of lights over the cross on a traffic circle. Rate of closure is easily determined and quickly made. Full bright position gives the surface of the Lamps brightness values of from 2 to 8 millicandelas. In formation, pilots notice the downward setting of about 15 millicandelas which is a fast perceptible brightness, enhancing but not obscuring the visually significant parts of the tail control surfaces and plane itself.

Second Phase—In the second phase of the project, cockpit and instrument lighting, the Aero Medical Equipment Laboratory is investigating methods of eliminating the form of the heavy blindman that stems from illumination of panels with bright white light. It has been found that red and ultraviolet light, being at the opposite ends of the color spectrum from white light, do not disturb the adaptation to darkness the pilot has acquired after being in the air at night for some time.

The Laboratory's work has involved the placing of red lights behind the instrument panel so that they uniformly light the dials of the instruments, the installation of small red individual lights around the edges of the instruments to light them either directly, or through Lamps, the direct illumination of instrument dials with ultra-violet light, and the installation of neon or low voltage red lights to shine upon the entire instrument board.

ASSEMBLY LINE PRODUCED VALVES INDIVIDUALLY-ENGINEERED FOR THE BOEING SUPERFORTRESS



In designing the great new B-36 Superfortress, Boeing engineers selected Whittaker Motor-Operated Valves for control of the wing fuel system. To meet the special requirements of the B-36, Whittaker engineers designed the basic motor valve pattern to include a special mounting adapter. It is this individual engineering of field-proven designs, combined with modern, assembly line production techniques that make Whittaker valves the leading choice among the best in the aircraft industry.



DESIGN FEATURES OF WHITTAKER MOTOR-OPERATED VALVES



FUEL TANK—Small fuel tank mounted on engine assembly can be actuated by valve.



POWER PACK—Small fuel tank mounted on engine assembly can be actuated by valve.



VALVE BODY MOUNTING—Type of valve body, gear, and mounting can be actuated by valve.

Whittaker has sponsored the development of over 175 different valves for the aircraft industry. Whittaker's staff of research engineers will design these valves to meet your specific requirements. Write our Engineering Sales Dept. for complete information. Whittaker Co., Ltd., 543 N. Canal Ave., Los Angeles 16, Calif. Eastern representatives: ARCO ENGINEERING INC., Rossmore Field, Jamaica, New York.

Whittaker

DESIGNERS • MANUFACTURERS • DISTRIBUTORS

LEVER AND MOTOR-OPERATED VALVES • GATE VALVES • VALVE ADAPTERS • FLOW VALVES • 5 WAY FLOW VALVES • 4-WAY SELECTOR FLOW VALVES • SWING CHECK VALVES • HYDRAULIC CHECK VALVES

Phillips fuels your flight at

*Tradewind
Airport*

AMARILLO
TEXAS



Tradewind, the first Approved Repair Station in West Texas, accommodates 50 airplanes and provides a hangar for Amarillo Airport.

Mr. Shirley N. Anderson has been an aviation enthusiast since his boyhood days (and undoubtedly he is now the young energetic president of the up and coming, new Tradewind Airport).



FROM AN AMERICAN CITY OF AMARILLO comes a new or old folk, called the Tradewind, built and equipped with for the use of private planes. Located just south of the city limits, this modern air field is the first in the country to use runways marked with Broadway grass, and kept in the peak of condition by underground, high pressure irrigation!

Just as a man is known by the company he keeps, so you can judge the quality of Phillips 66 Aviation Gasoline by those who use it. At the Amarillo Mustang, you'll know where the big sky is—here, as well as at the other, modern Tradewind Airports, you'll see the familiar sign of the Phillips 66 Aviation Gasoline. Phillips aviation products and Phillips service are well-known throughout aviation circles from the Dakota to the Rio Grande!

Yes, you can depend on Phillips 66 Aviation Gasoline! Phillips is one of the biggest suppliers of high-octane fuels for the Armed Forces. If you need help with your aviation fuel problems please write to the Aviation Department, Phillips Petroleum Company, Bartlesville, Oklahoma.



AVIATION GASOLINE

AVIATION SALES & SERVICE

Firestone Aircraft Supply Stores Show 25 Percent Sales Gain

Sales head sees steady increase of airports, plane registrations, an encouraging sign of continued aviation growth and development.

By ALEXANDER McURELY

A 25 percent gain in business by the Firestone, Inc., & Rubber Co. national organization of more than 3,000 retail airports dealers' stores in the first nine months of 1947 over the comparable period of 1946 is seen as a result of diligent application of modern merchandising methods to the aviation business.

Coming as it does in the face of a general slump in personal aircraft sales over the same period, the Firestone store sales gain offers an interesting case for analysis.

What are the broad line operations with Firestone dealer franchises doing that other operations are not doing?

Asked that question by AVIATION WEEK, Clyde Guehl, manager of aviation products sales for Firestone at Akron, Ohio, replied: "Some of our dealers are not buying the bushes for business. And we are trying to get the rest to do likewise."

The encouraging growth in business attributed most especially to Guehl is the following principal factors:

- Frequent contacts between Firestone district representatives and local dealers on special problems.
- Development of each airport store from a special plan drawn up by Firestone store planning service, to take advantage of available space, so that merchandise will be shown to the best advantage, and stocks will be conveniently accessible, plus use of modern display equipment.
- Holding down retail merchandise prices below or at least on a level comparable with prices of similar articles sold in other retail outlets.
- National advertising by Firestone of its aviation merchandise, aimed at the consumer.

• Local advertising programs using advertisements designed and provided by Firestone.

• Dealer meetings and sales clinics to introduce new products and sales methods.

• Catalogs and other sales material provided by the Akron organization.

Among its development of aviation

retail outlets on experience with a network chain of retail auto supply and home equipment stores, Firestone entered the aviation sales field in the fall of 1944.

With the advantage of large scale buying and large scale merchandising, the Akron company has sought to hold down merchandising costs in a continuing effort to reach new markets through its low retail prices.

As an example of a specific item, Guehl cited an American propeller gasket which was being sold competitively at a \$1.50 list price. Firestone went to its manufacturer with experience in aluminum fabrication, supplied a die, and succeeded in getting a product of comparable quality which is listed at \$1.05.

Outstanding individual dealers in various sections of the country account for a considerable portion of the gain for the first nine months in 1947 over the first nine months of 1946. Guehl points out, admitting that there have more than offset some losses incurred by other dealers.

Among sectional leaders in sales he cites:

- Lant Aviation Corp., Columbus, Ohio, increased sales 300 percent.
- Nix Supply, Inc., Washington, D. C., sold 150,000 lbs., increased 150 percent.
- Baker Flying Service, Peoria, increased 100 percent.
- Kennard Airpark, Wichita, increased 100 percent.
- Washington Aircraft, Seattle, increased 160 percent.
- Northeastern Air Service, Atlanta, increased 50 percent.
- Delta (Ferry) Aero Service, increased 40 percent.
- Omaha Aircraft, Omaha, increased 20 percent.
- Northeast Aircraft, Vancouver, increased 20 percent.

Typical of the sales and service literature that is now being distributed by Firestone to its dealers are a sales training bulletin and a five size air bulletin covering the latest of Fire



TELEVISION AT TRADWIND

A television program to acquaint the public with latest types of private planes was staged at Tradewind Airport recently with such success that Columbia Broadcasting Co. has indicated it may continue weekly. CBS used the facilities of Amarillo Aviation Corp., who introduced more than 60 calls on the day of the show from private and King studios. Photo shows the camera being towed on Sydney Road, Amarillo's (jokester, who "demanded" a French Bessie, Condor, C-42 and Piper Cub, and Betty Jane Williams, former Wagon and on either of the programs

star "My Caring" items and takes sales builders describe various new developments in the aircraft field, after manufacturers who use Pioneer tires as original equipment. Describes materials used and manufacturing processes, discusses types of tires and trends toward lighter and more economical aircraft, and refers dealers to catalogs and price lists for other information.

Service books cover some of the more material, both the various types and sizes of tires in the line, with loads and inflation for each, and then give a detailed discussion of tire care, inspection, repairing and rebuilding, divided into complete non-operation steps with plain graphs of each step accompanied by the detailed explanation of the operation.

While tires which dealers handle constitute a considerable volume of the total merchandise sold, the salesmen are supplied with a wide assortment of items intended to provide a complete line of aviation supply goods except for aircraft engine parts and components of the aircraft.

Some of the items include: radios, flying helmets, wrist chronometers, tools, batteries, switch tape, fire extinguishers, pumps, dopes, cigarette lighters, pen pellets, log books, instruments, and compasses, wind generators, windshields, antenna leads, etc.

Flights are made to keep the dealers continually well advised and they are supplied with postcards by the hour after in convenient order blanks, in which they can note in a few words, their words, and send it in without the having to write a long sales letter.

Dealers are supplied with ample identification material to show that their

hold Pioneer franchises, including large signs, window decals, stationery which use the Pioneer insignia into the local dealer's literature and quantities of direct mail material for distribution to customers.

Griffith admits that his company is looking at its aviation supply store business as a "long pull" proposition, rather than as a immediate large profit index, and points to the steadily rising market of airports, and plane and pilot registration, as indication that a healthy growth of potential customers for his company's merchandise is continuing.

The business may be hard to get, he concludes, "but it is there if you stick at it hard enough."

Niagara Airport Fire

Five recently destroyed low planes, a hangar and workshops at the Niagara Air Service airport near Niagara Falls, Ont. Loss was estimated at \$100,000 and is partly covered by insurance. The air service was started two years ago by Peter Campbell, a veteran. He plans to rebuild the airport.

New Bell Dealership

Bell Aircraft Corporation announced the acquisition of two test pilots, Harry Mitchell and James Thomson, who will join Elmer Schlaugher, a helicopter sales engineer, formerly with Bell and who has started his own company, Helicopter Services of California, at Oakland, Calif. Mr. Schlaugher has been awarded a Bell helicopter dealership covering Northern and Central California counties. Mr. Mitchell was the Army Air Force's first helicopter instructor.

Governor Stands Pat On Evans Ouster

Michigan's Gov. Kim Sigley has refused to take immediate action on the demand of the Aviation Association of Michigan (operator's group) for the ouster of Col. Floyd E. Evans for alleged handling of the GI flight training program.

Evans, director of the Michigan Department of Aeronautics since 1929 except during World War II when, during the AAM action "politely inquired" and points out that Michigan, with 12,000 GI enrollees, has 20 per cent of the total number of students enrolled in the national program.

A report on charges brought against Evans by the flight school operators and airport managers was to be heard at the next meeting of the Michigan Aeronautics Commission.

Governor Sigley, himself a pilot, commented: "I'm leaving the matter up to the commission, at least for the present, to see whether they can solve it." Evans said that some operators and airport managers are enforcing him "not failure to keep them informed of lower tuition rates and other changes the Veterans Administration made in its requirements for student training contracts."

"The VA wouldn't give out information on training rates to anyone, including my department," he declared. "Some operators are having a tough struggle to comply with changing VA requirements and observe the added regulations imposed by the Michigan aeronautics department in the interest of greater air safety."

For fool-proof, foul-proof performance the world over,

PIONEER PARACHUTES

Are Standard Equipment



P-3-B soft, flexible

Back Pack PARACHUTE

Standard equipment for the Air Force of the U. S. Army and Navy and other government, navy, police, landing air, and mail carriers.



P-1-20 Training PARACHUTE

Flexible back pack with newly developed cyclotriple parachute coverings. Both packs in single "quick fit" form.



Pioneer's Exclusive Quick-Fit Harness*



Just in Tug and it's loosened

AN-55 Military Model Seat type PARACHUTE

Standard equipment for the Air Forces of the U. S. Army and Navy and other government.



Just in Tug for perfect fit

PIONEER PARACHUTE CO., Inc.

MANCHESTER, CONNECTICUT, U. S. A.

SOUTHWEST FACTORY BRANCH, LONG BEACH, CALIF., TEX.

Pioneer Parachute Co., Inc., is a Selling Agent for War Surplus Parachutes of the U. S. War Assets Administration.

AVIATION WEEK, October 25, 1947

41



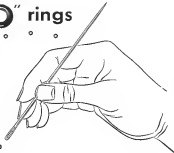
AIRPHIBIAN CONVERSION

Details of quick detachable propeller on the P-100 Amphibian are shown in photographs of Robert E. Fulton, its inventor, at Washington's National Airport. Spreads on top of an aircraft in a few seconds, and three propellers in aircraft hulls float with special lifting tool which fits inside hull. (From Aero Photo)



Model propeller makes amphibian out of the aircraft now doing. Other photo shows amphibious work of Amphibian sailing along. (From Aero Photo)

Precision "O" rings



—no larger
than a needle's eye!

Inside diameter just 1/16"... Outside diameter only 1/8"... Cross section a mere 1/32"... Working to these narrow limits it stands to reason that nothing could sove except utmost precision. So the manufacturer who had to have perfect "O" rings in end-gate size came to Linear.

But strictly-held tolerances are fully as important in any size. And Linear sizes include "O" rings all the way up to 36" i. d. Using finest synthetic rubber, especially developed for precision requirements, Linear assures you of "O" rings for your most severe demands—fluid-tight and gas-tight—

retaining their resistance to abrasion and a wide range of temperatures.

Maybe yours is a difficult special application, but put it up to Linear engineers. Their experience and facilities—their laboratory and operating tests—insure a finished product that's fit! Send complete data and plans to LINEAR, INC., STATE ROAD and SEVICK STREET, PHILADELPHIA 35, PENNSYLVANIA.

NOTE: Linear "O" rings are covered by *Christmas United States Patent No. 2,182,725*; all "O" rings sold by Linear are manufactured under royalty agreement with *patentees*.

LINEAR

LINEAR

INCORPORATED

Research Office and Factory

STATE ROAD and SEVICK STREET—PHILADELPHIA 35, PENNA.

OVER FIFTY YEARS
PROVEN EXPERIENCE

AIR TRANSPORT



BEECH TWIN-QUAD IN FIRST FLIGHT

Successfully completing its first flight at Wichita, Beechcraft Model 14 Twin-Quad performed "like a vesper" View Camera, Beech chief test pilot reported. The 20-passenger plane has four Lycoming engines rated at 275 hp each for takeoff, and two propellers Model 54-a equipped with a sheet-metal air curtain with fuel for 1,400 sq. in. maximum stage and 45 min. reserve. Transportation efficiency is high—48 passengers miles per gal. of fuel, or 27.8 gross ton miles per gal. at 180 mph. cruising speed, as expected by Beech engineers. Plane is designed for quick changeover from passenger to cargo space. (AVIATION WEEK, July 7)

Domestic Trunklines to Show Substantial 3rd Quarter Profit

Deficit for first nine months of 1947 still at record level despite traffic comeback and good earnings during latter part of August and September.

By CHARLES ADAMS

The domestic airlines, which were set back by unexpected early summer business downturns, made a strong recovery during the latter part of August and September, boosting passenger traffic to record levels and making up substantial profits.

But the favorable progress in the past two months will not prevent the carriers from entering the last quarter of 1947 with unqualified losses. On Sept. 30, 1946, the 16 companies were about \$4,113,000 in the black, while in the same date this year they probably will show an operating deficit aggregating at least \$10,000,000.

► **1946 Comparison**—During the first six months of 1946, the domestic trunklines earned about \$300,000, mounting this figure to \$1,775,000 by the end of July and \$4,003,000 by Aug. 31. A small increase in September lifted the nine-month operating profit to about \$4,113,000.

This year, the carriers had a \$16,000,000 deficit in the first half and last another \$825,000 in July. Preliminary

figures indicate an operating profit of about \$2,380,000 in August, which, along with September, was characterized by exceptionally good flying weather.

► **Traffic Oil**—Passenger traffic in August, for the third straight month, was behind the level of the preceding year. Prior to this June, traffic had gained over the corresponding month of the previous year by 45 consecutive months (Aviation Week, Aug. 25).

Last year, average passenger mileage was about \$62,000,000 in June, \$70,000,000 in July and \$24,000,000 in August. This year, the figures were June \$18,000,000, July \$16,000,000 and August \$61,000,000. During the first six months of 1947, passenger traffic was up 10 percent over the same period last year, but the July and August totals brought the gain for the first eight months down to less than 5 percent.

► **Gallop Over Railroads**—While the airlines' passenger increases have been far below the 25-35 percent gain forecast

by some industry optimists, they do reflect a rise in the use of air travel compared with other forms of transportation.

The Air Transport Association reports that the domestic airlines' 10 percent gain in average passenger miles during the first half of 1947 contrasts with a 45 percent decline in Pullman passenger miles and a 35 percent drop in day coach travel on class I railroads. Locally bus passenger miles dropped over 4 percent in the same period.

► **Revenue Rise**—Passenger increases of the domestic airlines were up 15 percent in first half 1947 compared with 1946, while railroad passenger revenue fell 13 percent. ATA pointed out that airline passenger revenue is now running more than 30 percent of Pullman and day coach revenue.

Operating expenses in domestic air transportation increased 31 percent in first half 1947 over the same 1946 period, while rail and bus operating expenses were up about 5 percent. Total airline operating revenues, including passenger, mail and cargo revenue, gained 19 percent, against 16 percent for the railroads and a 12 percent decline for bus companies. Air freight revenue was up 100 percent and air express revenue 52 percent, compared with a 28 percent gain in railroad freight revenue and a 36 percent rise in motor express income.

► **NWA Progress**—Business outlook for the domestic airlines, according to Carl Hester, president and general manager of Northwest Airlines, is brightening with volume. His statement coincided with an announcement that NWA in August did the biggest business and made the largest monthly profit in its history.

Hester said NWA's Alaska and Orient operations are already in the black, with traffic mounting extremely. Domestically, the carrier had an 81-85 percent load factor in August and reported continued good business through September.

► **Disaster Statement**—Western Air Lines President T. C. Driscoll was accused last week of claiming that his company's earnings trend should wipe out the Navy first quarter deficit and substitute a profit for the six-month period. WAL made a \$723,000 profit during the second quarter on a 58 percent load factor.

Saying that the carrier's best-ever load factor had been reduced to 62 percent, Driscoll announced continued profits in July and August on load fac-

of 66 and 72 percent, respectively. CAB's approval of Western's Los Angeles-Denver route sets it United Air Lines for \$173,000 has enabled WAL to retire its outstanding bank loans and increase its working capital.

► **American Lines Denied—Figures** through August show American Airlines with an eight-month operating deficit of \$2,187,000; Braniff \$871,000 deficit; Capital & Southern \$646,000 deficit; Delta \$384,000 deficit; Mid-Continent \$198,000 profit; National \$558,000 deficit; Northwest \$814,000 deficit; PCA \$2,417,000 deficit; TWA \$3,541,000 deficit; United \$1,634,000 deficit. Six-month operating results are: Capital \$2,044,000 deficit; Capital & Southern \$332,000 deficit; Eastern \$3,667,000 profit; Inland \$77,000 profit; Northwest \$2,064,000 deficit; Western \$192,000 deficit.

On the TWA-Atlanta run, Pan American showed a \$2,953,000 operating profit and TWA a \$1,457,000 loss in the first seven months of 1947. American Overseas Airlines was \$1,187,000 in the red during the first eight months.

In other overseas and international operations Northwest had a \$1,046,000 profit on its route to Alaska and the Orient at the first seven months and United a \$366,000 profit on its link to Hawaii during the same period. PAA's Latin American division reported a \$1,886,000 operating loss through July, but the carrier ended \$2,715,000 on its Pacific operations and \$571,000 on its Alaskan services.

Northwest, PCA Get New Routes

Northwest Airlines' long-sought extension from Detroit to Washington, D. C., was granted by CAB this month in one of a series of decisions which also give Capital Airlines (PCA) a link from Milwaukee, Wis., to Minneapolis/St. Paul.

Cleveland and Pittsburgh are included as intermediate points on the 199-mile addition to Northwest's system. Carl Hunter, NWA president, said his company will begin preparations immediately for the new service, which will permit one-carrier operations from Washington to the Pacific Northwest, Alaska and the Orient.

► **Applicant Since 1941**—Northwest has been trying to gain entrance to Washington since 1941. Addition of Cleveland, Pittsburgh, and Washington brings to 43 the number of cities on the carrier's domestic and international routes.

In contesting Northwest into Washington, CAB specified that service east of Milwaukee be limited to flight stopovers at Minneapolis/St. Paul, or points farther east, and terminating at

Auto Rental Plan

Northwest Airlines and Hertz Rent-A-Car have inked a new agreement in New England, New York, City and Montreal have instituted a plane auto rental plan, as a business leader and added service to customers of both companies.

Under the arrangement a passenger, before boarding a NWA plane, sends a telegram to the Hertz station at his destination, and an automobile is reserved for his arrival. Although rental rates vary, the total charge for a Ford, Chevrolet or Plymouth from 1 AM to 8 PM is \$8.50 plus 6 cents a mile. Rates for Saturday and Sunday are higher. A tank of gas, all oil and insurance protection are included in the rental cost.

Washington, Washington service on the new link will be limited to flight stopovers at Washington and terminating at Minneapolis/St. Paul or points west of the two cities.

► **Landis Dispute**—CAB Chairman Louis M. Landis described from the Board's denials extending Northwest from Detroit to Washington through Pittsburgh and Cleveland. He admitted that PCA should be given some compensation on its route 14 but said the carrier should not have been penalized substantially point for point between Washington and the two cities.

The restriction imposed on Northwest does little to reduce the severe competition provided Landis declared. Member Julia Lusk agreed that the restriction on NWA was inadequate. He said it would result in further increase of traffic from PCA and make it necessary to provide that carrier with a substantial increase in mail pay.

► **Supplemental Airline—PCA's** entry into the Milwaukee to Minneapolis/St. Paul was granted through a supplemental decision. Service to the two cities will be limited to flights originating at terminating at Detroit or points farther east on PCA's system.

CAB member Clarence Young, in a separate opinion, questioned the use of PCA's action in extending PCA to Minneapolis/St. Paul. He said that in view of the extension of Northwest to Washington, the link provides only a small amount of new service to the two cities and offers little promise as a strengthening factor with respect to PCA's financial position.

► **C & S Extended—Minneapolis**, in the Eastern City (Chicago) Division, CAB extended Chicago and Southern Air Lines' route 8 from Memphis,

Texas, to the terminal point Kansas City, Mo., via Springfield, Mo. Applications of Board, Delta, Eastern and Mid-Continent for the same service were denied, although Chicagoan Lines and Southern Air Lines and members of MCA. All bids for additional service between Memphis, Atlanta and Florida were denied.

In other parts of the five opinions, the Board:

► **Designated** Toledo, O., as a new intermediate point between Cleveland and Detroit on PCA's route 14.

► **Revised** from United Air Lines' route 1 certificate the restrictions providing service to both Detroit and Cleveland on the same flight.

► **Denied** application by TWA, United and Eastern for new trunkline service to Pittsburgh. The bids were pending in the Middle Atlantic Area and scheduled prior to a decision in the reconsideration of the pending because of related action in the Detroit-Washington case opinion.

► **Granted** Eastern Air Lines' application for reconsideration of the Birmingham-Columbus-Atlanta segment of route 5 with route 10 to provide a more direct through service from Memphis to Atlanta, Jacksonville and other east Florida points.

Mail Rate Proposed On Braniff Overseas Run

Braniff Airways will receive 95 cents a plane mile mail pay when it commences service to Latin America if CAB places an effect temporary rate proposed this month. The carrier had asked for \$1.51 a plane mile.

CAB said base schedule for setting a temporary mail rate should be established on the basis of three through schedules a week between Houston, Tex., and Lima, Peru. "Beyond Lima," the Board declared, "operational difficulties and uncertainties as to the effective date and nature of operating rights are such that the base schedule should not include any schedules until problems are eliminated to the extent that it would be demonstrated a trouble-free operating plan."

Braniff's Latin American route, granted in May, 1946, extends beyond Lima to Rio de Janeiro and Buenos Aires.

High Costs Hit UAL

United Air Lines will probably plan a price hike as a new longer at Boston because of difficulty in keeping within authorized President W. A. Patterson states it is doubtful if the company will be a break even here until costs stabilize. Estimated cost of the company's new Chicago branch was \$740,000, but with the project only 70 percent completed it has required \$2,100,000.

EVER SEE A PROPELLER ON THE Side OF A SHIP?



WELL, HERE IT IS
and it says **SENSENICH**
on every blade!

ITS on the famous Fibron Airplane—the airplane that provides its own transportation from airport to town. After landing, the fuselage is easily detached. The special three-bladed propeller is removed in 30 seconds and hung on the side of the fuselage—while the front of the craft becomes the unobstructed equivalent of a modern motorboat.



There's nothing unusual about finding a Sensenich Propeller on this new ship. Sensenich engineers have worked with most designers of most new aircraft. That's because aircraft designers—like aircraft pilots—recognize the importance and value of Sensenich's experience and quality. Sensenich is the world's largest manufacturer of wood aircraft propellers.



Prompt Repair Service—all makes of wood propellers—from Sensenich's PROP-SHOP.

SENSENICH CORPORATION • Main Plant, LANCASTER, PA. • West Coast Branch, GLENDALE, CALIF.

AVIATION WEEK, October 20, 1947

AVIATION WEEK, October 20, 1947

AIR LINES

Jim:
Here's the information
you wanted on Mareng fuel
cells. No doubt about it,
they increase the dependability
and availability of our
Martin 2-0-2's.

Tom



Flexible Mareng fuel cells, available Martin development, are easily slipped in and out of the Martin 2-0-2's wing access hatches. This eliminates wing tear-downs, reduces maintenance time and cost.

Here's How Flexible Mareng Fuel Cells Cut Costs, Increase Dependability of the Martin 2-0-2

LEFT WING PANEL OF MARTIN 2-0-2



The four interconnecting Mareng fuel cells in each wing panel provide safe, dependable storage for the 2-0-2's gasoline. The individual cells eliminate the need for excessive cranking, intricate corner assemblies or troublesome metal work. Makes inspection, repair, replacement easy.

CROSS SECTION OF MARENG FUEL CELLS

Cross access doors molded in rear of fuel cell support. This Mareng fuel cell can be inspected under severe conditions or vibration. Results in increased dependability and lower maintenance cost on the Martin 2-0-2. The Glenn L. Martin Company, Baltimore 3, Maryland.

OTHER SPECIAL FEATURES OF THE MARTIN 2-0-2 INCLUDE—

1. 260 m.p.h. cruising speed.
2. Unexcelled loading—superior C, G, range.
3. Shorter runway requirements.
4. Aerodynamically superior wing, flap and aileron.
5. Heat anti-icing.
6. Automatic propeller de-icing.
7. Built-in landing augs.
8. Underwing fueling.
9. Easily accessible servicing hatches.

Martin
AIRCRAFT

Builder of Dependable Aircraft Since 1909



AMBASSADOR IN FLIGHT

Engine's power to improve competition in business type aircraft is the Ambassador. "Ambassador" shows for the first time at the Red Bull air show. Features include 260 mph. cruising speed, seats for 40 passengers, pressurized cabin, thermal heating, retractable prop, and landing flap high speed wind design. Range is 1,000 mi. with retractable engine and 2,500 mi. with turbo-prop (optional). (World Newsphoto)

Pilots Support Flight Engineers

Management now fears that drive is underway to "four- bed" air transportation.

The Air Line Pilots Association and other unions took their arguments for additional flight crew members on four-engine aircraft into a CAB hearing that month as management representatives voiced fear that a drive is underway to establish "four-bedding" practices in air transportation similar to conditions prevailing on the railroads.

In urging Civil Air Regulations requiring a flight engineer on all four-engine transports, J. E. Wood, first vice president of ALPA, pointed out that his association does not represent any group which will profit in an employment sense. He said, however, that the pilots' concern from the standpoint of safety is acute.

Too Many Gadgets—"For several years pilots have voiced with alarm and consternation the need of increasing tendency to put pilots on top of gadgets which in turn will work other gadgets. The increasing size and complexity of the modern aircraft, and the difficulties involved in its operation under present complicated traffic control procedures, with inadequate airports and landing facilities, are problems which can no longer be overlooked."

Wood and the total DC-6 check list consists of 191 items to be checked or which require close attention from the two men flying under varying conditions. He added that the cockpit of both the DC-4 and DC-6 is so wide

that many important knobs and controls are hard to reach in a hurry.

Competition Given—Total items (including those not covered by the check list) which require the pilots' attention number 185 on the DC-1, 345 on the DC-4 and 445 on the DC-6. Wood declared, The Comptroller, he continued, has 615 items, but it is possible to delegate 795 of these to the flight engineer, leaving 334 under direct supervision of the pilots.

Wood stated that an additional crew member be required on all four-engine aircraft now operating with a two-man crew and that all new four-engine aircraft be required to have a minimum of the added man in the cockpit. Even when a station is not provided in the original design it still would be a great contribution to airline safety if a third crew member is able to handle an additional pair of eyes outside the cockpit, Wood stated.

TWU Position—A representative of the Twentieth Transport Workers Union of America (TWU) declared that every aircraft with four or more engines flying over water or long land distances should have, in addition to the pilot and copilot, a flight engineer, navigator and radio officer. He said opposition is such a new competition comes not only from the airlines and ATA but from certain pilot groups.

The Transport Workers Union charged that management has "killed" within CAB and CAA which they are able to reference and pressure. The union was withdrawn upon the pre-

test of CAB Chairman James M. Landis and Vice Chairman Gerald R. Ryan.

Arnold Withdraws—ATA Vice President Milton W. Arnold and present Civil Air Regulations adequately provide for the guidance of CAB and the operators when use of a flight engineer, navigator or radio officer is necessary. At present, the minimum flight crew for an aircraft is established at the time the plane is certificated.

"In view of the many variations in operations, we maintain it is not practicable for CAB to write more detailed regulations as to crew complement than are now provided in parts 64(R), 43, 46 and 61," Arnold declared. "It is the opinion of the airlines that crew complement is inherently the prerogative of management, and the Government should not attempt to make all-inclusive regulations."

Furtherbedding Feared—"While considering the safety problem, like many others, it is essential that CAB proceed cautiously in order to avoid paving, in the name of safety regulations, the poorly reasoned desire of airline employee groups."

Immediate hearing of the arguments for an additional flight crew member, particularly an engineer on four-engine aircraft was urged on CAB in August by the President's Air Safety Board. CAB's safety bureau has already proposed amendments to part 64(R) of the Civil Air Regulations requiring that a flight-engineer station be provided on all four-engine planes certificated after Dec. 31, 1948.

AOA Returns Planes Leased From Army

Nagasaki in the American Overseas Airline pilot strike have begged down after talks with a member of the National Mediation Board. The airline has turned back to the Army three C-54s which it has been leasing and has offered its own 14 planes to other Transatlantic operators to use until the strike is settled. Consolidations are being offered at \$738 per day plus \$35 per hour. Army lease rates are offered at \$505 per day plus \$10 a flying hour.

Company officials have discussed the steadily growing with the pilots but report no progress towards settlement of the strike.

Food Conservation

The Air Transport Association has announced that the scheduled domestic airlines will stop serving meat on Tuesdays and eggs and poultry on Thursdays in accordance with the Government's food conservation program. Withdrawal of the domestic airlines was also contemplated.

CAB Grants Rights To Six Cargo Lines

Six major cargo lines have been granted permission to engage in common carrier operations pending CAB decisions on their applications for certification. Companies receiving letters of registration this month were: World Air Service, Totowa, N. J.; Mohr Aviation, Inc., Buffalo, N. Y.; Air Cargo Transport Corp., New York; California Eastern Airways, Oakland, Calif.; The Flying Tiger Line, Berkeley, Calif.; and Riddle Aviation Co., Coral Gables, Fla.

Four other companies—Globe Freight Airline, St. Louis; American Air Service and U. S. Airlines—previously were granted letters of registration. The request of Helms Van Lines Co., Los Angeles, was denied, and 12 applications are still pending. Of the ten companies granted common carrier privileges, St. Louis, U. S., Mohr, the Flying Tiger, Air Cargo Transport and California Eastern operate transcontinentally.

U. S. Airlines' letter of registration permits common carrier service to 12 different points, St. Louis 26 points, Mohr 15 points, Flying Tiger 18 points and the Mustang, the Flying Tiger 14

points. Air Cargo Transport 15 points, Globe 16 points between Boston and New Orleans, California Eastern 8 points, Riddle Aviation 4 points between New York and San Jose, and Mohr 2 points—New York and Buffalo. The ten carriers operate more than 68 planes, including C-54s, C-46s, C-47s, Lockheed Lodestars and B-24s.

J. J. O'Brien Leaves California Eastern

J. J. O'Brien, president and director of California Eastern Airways, transcontinental all-cargo line, has submitted his resignation to the board of directors. Other personnel developments:

► **American Airlines**—George H. Smith, Jr., executive vice president, resigned after four years.

► **American Eastern**—Henry W. Smith, Jr., executive vice president, resigned after four years.

► **Northwest**—W. Thomas has joined the engineering department.

► **United**—William J. Smith has been elected vice president. He joined the company in 1938 and previously has been vice president in the company.

► **Continental**—Fred J. Smith, Jr., regional vice president, resigned. A. Smith, New York; Alexander L. Smith, Seattle; H. J. Smith, Miami; C. D. Smith, Chicago; E. H. Smith, Detroit and J. Smith, St. Louis.

► **Trans World**—J. Smith, executive vice president of the West Coast division, resigned.

► **United States**—J. Smith has been elected vice president in the American Airlines division.

► **World**—J. Smith, executive vice president of the American Airlines division, resigned.

► **World**—J. Smith, executive vice president of the American Airlines division, resigned.

► **World**—J. Smith, executive vice president of the American Airlines division, resigned.

► **World**—J. Smith, executive vice president of the American Airlines division, resigned.

► **World**—J. Smith, executive vice president of the American Airlines division, resigned.

► **World**—J. Smith, executive vice president of the American Airlines division, resigned.

► **World**—J. Smith, executive vice president of the American Airlines division, resigned.

► **World**—J. Smith, executive vice president of the American Airlines division, resigned.

► **World**—J. Smith, executive vice president of the American Airlines division, resigned.



THE WAR-BORN AIRCRAFT FREEZER THAT MADE GOOD!

HERMAN NELSON PORTABLE GROUND HEATERS FOR COMMERCIAL AIRCRAFT

Thousands of units, with millions of hours of service, have proved the worth of Herman Nelson Portable Heaters at air bases and ports throughout the world. Designed originally for the Army Air Force, these heaters are now available in improved commercial models for preheating of aircraft engines, instruments, cables and controls.

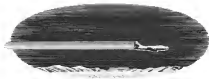
Combat cold weather maintenance, repair and warm-up difficulties this winter by using this portable source of quick, clean, safe HEAT. Herman Nelson Portable Ground Heaters are regularly in use on some of the nation's largest airlines.

Write today for catalog and prices.



THE HERMAN NELSON CORPORATION
MOLINE, ILLINOIS

SINCE 1918 MANUFACTURERS OF SAFETY HEATING AND VENTILATING PRODUCTS



How AiResearch aids the RECORD-BREAKING JETS

When Navy pilots smashed the world's speed record last August over the scorching deserts at Muroc, California, a modest AiResearch carburetor refrigeration unit cooled those flames over the cockpit of the Douglas jet-powered D-558-2 Skyrocket.

During the first run which averaged 6487 m.p.h., skin temperatures of the Skyrocket, lashed by air friction and heat of the sun, were about 160 degrees F. Bleed air from the jet engine, source of air for the carburetor, was a scorching 450 degrees. Yet the AiResearch carburetor discharged air into the cabin between 30 and 40 degrees, keeping cabin temperature at approximately 90°.

Thus the extreme cockpit temperatures encountered today in high-speed jet-propelled planes are being successfully controlled by rugged AiResearch carburetor refrigeration units. For the past eight years that company has pioneered the field, designed and built the first experimental models, and is today equipping a major share of all jet-propelled airplanes under construction or flying in the United States.

In addition, AiResearch leads in the field of complete air conditioning and cabin pressurization systems for Army, Navy, and commercial aircraft. Call upon this unusual background of skill and experience to help solve your aircraft air conditioning problems.

AIResearch MANUFACTURING COMPANY
LOS ANGELES 24, CALIFORNIA

AiResearch
A Division of
THE GARRETT CORPORATION

PARTIAL LIST OF JET AIRPLANES USING AIResearch CABIN PRESSURE AND REFRIGERATION EQUIPMENT	
	CABIN PRESSURE REFRIGERATION
Consolidated XE-45	..... X
Consolidated XP-8	..... X
Curtiss XP-57	..... X
Douglas XE-45	..... X
Douglas D-558 (Navy)	..... X
Lockheed P-58	..... X
Martin XE-45	..... X
McDonnell XE-45 (Navy)	..... X
North American XE-45	..... X
Northrop XE-45	..... X
Republic P-84	..... X



Write Representative: NEW YORK: East Engineering, Inc., 100 W. 42nd St., New York 36, N. Y. • CHICAGO: C. H. Supply Company, 2712 East Ave. • WICHITA, K. S.: Chicago, 412 E. Gilbert

So The War Goes On

AVIATION WEEK on Sept. 28 deplored the fact that four major airlines had agreed their intention to undertake cargo rates charged by independent freight airlines. CAB permitted the rates to go into effect. We pointed out that the independents' only income is from commercial traffic. They receive no Government mail pay and no passenger fares. If their rates are unreasonable these freight lines must inevitably go out of business. The public's pocketbook is sacrificed. From a public relations standpoint it is and always has been to the interest of the major air carriers to let the freightmen eliminate themselves.

Instead, however, several big lines announced still lower rates, obviously to win the independents out of business in a hurry. They chose the moment when a special commission of the President of the United States is trying to find among other things, how to keep the maximum number of commercial aircraft flying in this country without Government subsidy, as the taxpayers can be relieved of supporting at least some part of a military transport fleet. These airlines also chose the very time most of the established air transport industry seeks higher mail rates and when increased passenger fares are under discussion.

CAB is within its rights in letting the new rate structure start. It is definitely right in ordering a thorough investigation. But it is now under solemn obligation to rush that investigation while there is still an independent air freight industry. There are not many of us so naive as to believe that such immediate action will be forthcoming from CAB. Thus, the continuing reason that CAB is none a prototype of the established certificate holders than it is an impartial public agency are bound to give space and word up in more doing of airline matters in high places. The action of a few ill-informed airline executives will have started a whole series of diagnostic and workflow developments which may well have crippling effect on the world's freest airline system. We are not believe that the old established carriers, guaranteed by the Civil Aeronautics Act against unfair rates could have suffered irreparable loss from the cargo carriers, or could not have waited a few more months for their unusual competition—if they are unwise—to go out of business.

The action may well have important repercussions on Capitol Hill, in the President's Air Policy Commission, and in propaganda broadcast in the steamships and rail roads.

Already the publication of the Federation of Railway Progress is saying:

"In Washington, the Air Transport Association's Admiral Henry S. Land was telling up the development of new types of air cargo planes on a large scale. It would be nice if the Government would sponsor such a program, he told the President's Air Policy Committee. . . . Elsewhere, airlines were asking for permission to cut air cargo rates, and for increases in the amount of money they get for carrying the air mail."

And Railway Age quotes from a report by the railroads' industry's subcommittee on air transport of the Railroad Committee for the Study of Transportation as follows:

"Present freight rates of both the scheduled and non-scheduled lines are on a 'below cost' basis, in many cases being 'in low or lower than the charges for first class mail express'." The report added that such rates are made possible by "subsidies and other public aid . . . but even with such aid many of the carriers are operating at a loss." The conference carried had assurance that any airline mail rates would have been adjusted. The independent had no government assistance on anything.

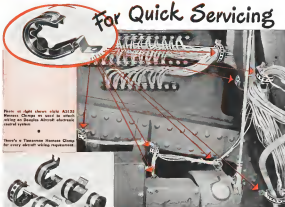
Such comments are bound to multiply. As long as the airlines maintained some semblance of economic rates on cargo they were in stronger position to fight for and win higher fares and Government mail rates. By adopting cut rates on freight, for selfish reasons, which they cannot support while they lose money on other operations, they thereby the wires and put themselves in an inferior bargaining position which cannot do anything but harm the nation's airline system.

As for CAB's contention that air mail pay is based entirely on the evaluation of the public service, without regard to an airline's other income, it may be legally valid. But no one familiar with the facts of life in the air transport business believes that non-scheduled operations in cargo are unrelated to "air income" from mail.

So, in in most ways, a few men have touched off what could be a serious conflagration.

TINNERMAN HARNESS CLAMPS

For Quick Servicing



Point in right shows slide A3125 Harness Clamps are used to attach wires on flexible aircraft harness control system.

There's a Tinnerman Harness Clamp for every aircraft wiring requirement.

The Tinnerman A3125 HARNESS CLAMP has unique advantages in wiring all types of aircraft. It has a latching tab which works independently of the attaching screw, permitting removal or replacement of wires without loosening the screw.

Once attached to the wall, it may be swapped open or closed by hand—saving hours of time in wiring service. Two latching stations are provided to accommodate varying thicknesses of wire bundles, thus reducing the number of stock sizes. The interior of the extruded synthetic channel is slotted to provide a firm grip on harness and eliminate friction chafing.

A3125 HARNESS CLAMPS are available for harness sizes from 1/8" to 1 1/2". Made of SAE 1060 steel, heat-treated, with a rust-proof finish and extruded synthetic channel. Write for samples, prices and engineering data.

TINNERMAN PRODUCTS, INC.
2210 FULTON ROAD CLEVELAND 13, OHIO

In Canada: Western Electric Co. Ltd., Hamilton, Ontario
In England: Birmingham Aircraft Works Ltd., Walsley

In France: Aeronautique Industrielle, S.A., Paris
In Germany: Aeronautische Werke, P.O. Box 100, Berlin

Speed

MOORE THAN 2000



Auto

SHAPES AND SIZES

FASTEST THING IN FASTENING

Service of Supply
FOR JET ENGINES



DUAL

DOWTY
Fuel Pumps

DUPLEX



SINGLE



*For U.S.A.
manufacturing
licences
apply to*

Dowty Fuel Pumps deliver 600 to 1,320
Imperial gallons per hour at 3,500 r.p.m.
and 1,000 lbs. per square inch pressure

DOWTY CORPORATION · 25 BEAVER STREET · NEW YORK 4 · N.Y.
DOWTY EQUIPMENT LIMITED · CHELTENHAM · ENGLAND
DOWTY EQUIPMENT (CANADA) LIMITED · 999 AQUEDUCT ST. MONTREAL 3 · CANADA